EXAMINING THE RELATIONSHIP BETWEEN TOP MANAGEMENT SUPPORT, PRODUCT STRATEGIES AND INTERNAL SUPPORT IN NEW PRODUCT DEVELOPMENT SUCCESS ON MANUFACTURING FIRM IN MALAYSIA

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ABSTRACT

New Product Development (NPD) has become a major concern in all types of companies particularly in the manufacturing companies and its success is undeniably vital to the viability, growth and prosperity especially in today's modern corporation. This research aimed to identify the relationships between the various factors that can generate a stream of market led and technical support for the business operation in Malaysia. The identified factors are top management support, internal and external support, product strategies and training. Through the mail survey, 250 companies have responded to the distributed questionnaires where 37.1 percent respondents were operation managers, 37.1 were marketing manager and 25.8 percent were managers in Malaysia. In this research we use SPSS to analyze the data and test of hypothesis using hierarchal regression with alpha value. However, only 229 or 91.6 percent of the responded questionnaires were usable. The respondents cover 71.2 percent of the manufacturing companies, where 28.8 percent were respondents from the electric and electronic companies. All the companies which responded were involved in product development, with a minimum of one product pattern and a maximum of five product patterns and this covers 59.8 percent of the respondents. The hypotheses used were tested by using correlation and regression techniques. The result of the study supported all the hypotheses. The multiple regression analysis indicated that there are significant relationship among the variables such as top management support, internal/external support, product strategies and training, on the usefulness of the new product development (NPD). It is believed that outcome of this study will benefit the manufacturers, government decision maker in making manufacturing policy, academician in formulating syllabus and the top management of companies into successfully implementing the new product development (NPD) and having the ability to counter any major competitions in future.

Keyword: Manufacturing, New Product Development, Product Strategies, Training, External Support

ABSTRAK

Pembangunan Produk Baru telah menjadi satu keutamaan semua syarikat kini. Ini terutamanya melibatkan syarikat yang berkaitan pembuatan. Kejayaan pembangunan produk baru merupakan faktor penting yang menyumbangkan kepada daya maju, pertumbuhan dan kesejahteraan syarikat khususnya dalam perniagaan moden hari ini. Kajian ini bertujuan untuk mengenal pasti hubungan antara faktor-faktor yang boleh menjadikan sesebuah syarikat menguasai pasaran dan teknikal untuk menyokong operasi perniagaan di Malaysia. Faktor-faktor yang dikenal pasti ialah sokongan pengurusan, sokongan dalaman dan luaran, strategi produk serta latihan. Kajian ini menggunakan tinjauan melalui pos. Sebanyak 250 buah syarikat telah memberikan respons. Berdasarkan respons tersebut sebanyak 37.1 peratus responden adalah pengurus pembuatan, 37.1 peratus responden lagi adalah pengurus pemasaran dan 25.8 peratus adalah pengurus di Malaysia. Kajian ini menggunakan alat SPSS bagi menganalisa data dan menguji hipothesis menggunakan hierikal regrresi dan nilai alpha. Namun, hanya 229 atau 91.6 peratus daripada respons itu boleh digunakan. Respons ini mencakupi 71.2 peratus syarikat pembuatan. Sebanyak 28.8 peratus adalah respons daripada syarikat berkaitan elektrik dan elektronik. Semua syarikat ini terlibat di dalam pembangunan produk dengan minimum pembangunan satu paten dan maksimum lima paten. Ini bersamaan 59.8 peratus daripada jumlah responden. Hipotesis yang terlibat telah diuji menggunakan korelasi dan teknik regresi. Hasil analisis kolerasi ini menunjukkan semua hipotesis disokong. Analisis regresi menunjukkan bahawa terdapat kesan yang signifikan pada setiap angkubah latihan, produk strategi, sokongan luaran ,sokongan pengurusan untuk pembangunan produk baru. Hasil kajian ini diharapkan akan memberi manfaat kepada pengeluar, pembuat dasar dalam kerajaan bagi membuat polisi pengeluaran, ahli akademik bagi membuat silibus pengajian dan pihak pengurusan tertinggi syarikat dalam menjayakan pembangunan produk baru dan mendepani persaingan di masa hadapan.

Kata kunci: Pembuatan, Pembangunan Produk Baru, Strategi Produk, Latihan, Sokongan Luaran

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

This study explores the impact of top management support, product strategies and internal/external support in new product development mainly in Malaysian manufacturing industry. In particular, it will touch to highlight the relationship and significance factors of top management support, external support, new product development strategies and new product development teams in new product development success. This chapter contains the discussion on the background of study, problem statement, research objectives, research question, scope and significant of study.

1.1 Background Of Study

In Malaysia's manufacturing sector there is no end for nonstop development efforts especially in new product development (NPD). In order to accomplish the competitiveness level and innovative capability that up to the global standard, the manufacturing sector is trying to do its best. Malaysia also will be a country that manages to manufacture a higher-tech, higher-value added and more sophisticated

products and services. Also from joint-ventures and collaborations strategy made with local and international institution and developed nations yield a lot of benefits. After that, Malaysia can go to a higher level and respected globally. Furthermore, from that strategy Malaysia can obtain a flow of expertise that really need and as well as valuable technology transfer. On the other side, Malaysia can also carry out some projects abroad with the developed countries expertise and material and labor from Malaysia. This will give credits to both parties. After a while, Malaysia can be proud to be known as a successful developing country.

As we all know, Malaysia also known for its agro based sector. In Malaysia, some commercial based plants are heavily grown and these plants are harvested to produce some kinds of raw material such as palm oil, rubber, timber, rice and fiber. Unfortunately, the revenue that can be generated from agro based sector is not really massive compared to manufacturing sector. For that reason, with the availability of the manufacturing sector, Malaysia does not need to rely on the agro based sector only. In addition, manufacturing sector can help in boosting the development of agro based sector by offering the capabilities of some downstream activities such as product processing, packaging and distributing. These activities are useful in order to turn the raw material such as palm oil, rubber, and rice into finished product or half finished product. Besides, the manufacturing sector can assist in the utilization and NPD of R & D and technology adoption for business and manufacturing purposes. Along the way, knowing the critical factors of successful NPD can help and lead the Malaysian manufacturing sector new products to compete and survive from the globalization.

1.2 Problem Statement

According to Leenders et al (2003), new product development (NPD) is the locus of the innovative prospective of organizations. Each organization, regardless of size, profit motive, or industry experiences regular pressures to renew, expand, or modify its product or service offerings. Gonzalez and Palacious (2002) stated that the rate of market and technological changes has accelerated in the past decade. Central to competitive success in the present highly turbulent environment is the firm's capability to develop new products. New products are increasingly cited as the key to corporate success in the market. During the 1970s, new products accounted for 20% of corporate profits; in the 1980s, they accounted for 33% of profits (Takeuchi and Nonaka, 1986). In the 1990s, this figure has risen to 50% (Slater, 1993).

Primary industries were the leading sector of the Malaysian economy for a long time before 1990 as agriculture; mining and quarrying represented 36.9% of Gross Domestic Product (GDP). However, Malaysia has been successful in transforming the commodity based economy to an industrialized economy, with manufacturing activities gradually becoming the leading growth sector such that the proportion of the manufacturing sector to GDP raise from 22.1% in 1978 to 31.6% in 2005. The development of the services sector as well has not been left out and its contribution to GDP increased from 38.3% to 58.2% over the same stage. (Normah, 2007)

Page (1993) highlighted that new products provided over 42 percent of company sales in the period 1985 to 1990, up from 33% in 1980. The number of new products

introduced by these firms was predictable to double up (Booz et al, 1982). However, new products continue failing at a shocking rate. The most studies show new product success rates at launch of less than 60% for the UK, 59% for the US, 59.8% for Japan and 49% for Spain (Edgett *et. al*, 1992).

Driven by the globalization of markets, technological advances and ever-changing customer needs, product innovation is now the number one plank in many companies' tactical platforms (Cooper, 2000). NPD process will generate a stream of market led, technically and commercial viable new products to support the business plan, with minimum risk. According to Ramaseshan *et al.,* (2002), new products are essential to the survival and long-term growth of any firm. Success in new product development is a critical management issue particularly in technology driven firms. Managers of new products have little guidance on how to improve on redirect their organization's external orientation towards their product target market. Several works documented that top management initiative and support is a key aspect in order to achieve new product success (Zirger and Maidique, 1990; Chorda *et al*., 2002; Varela and Benito, 2004).

The 'internal knowledge might complement and leverage a firm's own knowledge output' and thus be a critical sources of organizational NPD. Other than that, many studies concluded that practice increases a project innovation and NPD success rate (Sanchez and Perez, 2003; Atahuene and Evangelista, 2000; Bonner *et al*, 2002; Jassawalla and Sashittal, 1998). Latest years have witnessed extensive research into the determinants of new product success. However, these studies do not emerge to have had much of an impact on managerial performance. Therefore, a clear understanding of the

factors that drive new product success is needed in order to help firms optimize the resources dedicated to the product development process and raise the market demand for a manufacturing firm's new products.

This study aims to identify the critical success factors that are correlated with the NPD in a statistically significant manner by adapted the model from Gonzalez and Palacious, (2002). According to Gonzalez and Palacious (2002) in their journal suggested that the critical success factors have common factors such as top management support, market orientation, NPD process, NPD speed, technology, knowledge management, NPD teams and NPD strategies. However, this study will only focusing on top management supports, external supports, NPD strategies, and NPD teams. This study will also describe a survey of NPD in Malaysian manufacturing industry and discusses the implications of these findings for this sector.

Therefore, it is hoped from this study to identify the role of strategies, training, management support in new product development for Malaysian manufacturing industry can help the companies by improving and increasing the effectiveness in NPD success for this sector and others to encounter the major challenge for future.

1.3 Research Objectives

This study is to identify the critical success factors that affect the new product development in Malaysian manufacturing industry. There are several research objectives that this study attempts to be achieved, which are to:

- To explore the relationship between top management supports and new product development success.
- To investigate the connection between internal and external supports to new product development success.
- To analysis the relationship between product strategies and new product development success.
- To examine the relationship between top management supports,internal/ external supports, product strategies and training on new product development success.

1.4 Research Questions

This study is to investigate the critical success factors that affect the new product development in Malaysian manufacturing sector. In achieving the above objectives, this research addresses the following questions:

- What are the relationship between top management supports, external supports, NPD strategies and NPD teams) in new product development.
- What are the relationships between top management support s of new product development.
- What are the relationship between product strategies that affects the of new product development.
- What are the relationships between training new product development.

- What are relationship between internal/external support and new product development

1.5 Scope Of Study

This study is limited to identifying those variables for the critical success factors in NPD that survey Malaysia manufacturing industry. These only include the top management support, external support, NPD strategies, NPD teams and NPD success. This study fundamentally intends to investigate the critical factors which affect the success of new product development among the Malaysian manufacturing companies. For that reason, the findings of this study are not applicable to others industry in Malaysia. Precisely, the result of this study can demonstrate the practices in Malaysian manufacturing companies that influence the factors that lead their successful development of the new products.

1.6 Significance of Study

This study is to identify the critical factors that lead the success of new product development (NPD) among the population of Malaysian manufacturing firms. In extra, it will also spot the challenges that involved in practicing the new product development for this industry.

For researcher, from the previous studies identified critical success factors in new product development have many factors that influences the success and failure of

new products and many researcher try to group or categorize the critical factors. The finding of the study also gives a strong support for the validity of critical success factors in NPD suggestion as has been analyzed from the previous researcher.

Hopefully from identification of the new critical factors may help in better understanding of how to improve more effective's factors that will eventually lead the companies to improve the success of new product development, especially for Malaysian manufacturing companies.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter introduces literature review about critical success factors in new product development (NPD). The chapter also reviews the related literature extensively. It conceptually gives an insight or review on the previous and existing works that have been conducted in the same area. This chapter is organized into eight specific sections with different subtopics. After the introduction, the first section begins with the manufacturing industry in Malaysia. The following second section is talk about the related study of concept of new product development, the third section is about the critical success factors that have been done by previous studies, the fourth section is explain about the underlying theory, the fifth section is about the theoretical framework, the sixth section is about hypothesis, the seventh section talk about the measures of NPD success and, the last section is discussing and review about study of critical success factors that focus on top management support, external support, NPD strategies and NPD teams in new product development.

2.1 Manufacturing Industries in Malaysia

The manufacturing sector has been the main factor of the growth of the Malaysian economy for the past 30 decades. As of the statistics published by the Department of Statistics Malaysia in the January of 2011, the sales value of the Manufacturing sector in January 2011 post a year-on-year growth of 7.7% (RM3.4 billion) to record RM46.9 billion as compared to RM43.5 billion reported in January 2010. Month-on-month, the sales value, however, decreased by 3% or RM1.5 billion as compared with the preceding month. The sales value in December 2010 was a revised positive 11.5% year-on-years to record RM48.3 billion.

The year-on-year increase (Figure 2.1) in the sales value during the current month as compared with the corresponding month of the previous year was generated by the growth in the sales value of 70 industries (60.3%) out of 116 industries covered in the survey by the Department of Statistics Malaysia. The five major industries whose sales value increased significantly were Manufacture of Refined Petroleum Products (46.4%), Manufacture of Plastics in Primary Forms and of Synthetic Rubber (58.3%), Rubber Remilling and Latex Processing (63.0%), Manufacture of Other Vegetable and Animal Oils and Fats (150.3%), and Manufacture of Motor Vehicles (13.8%).

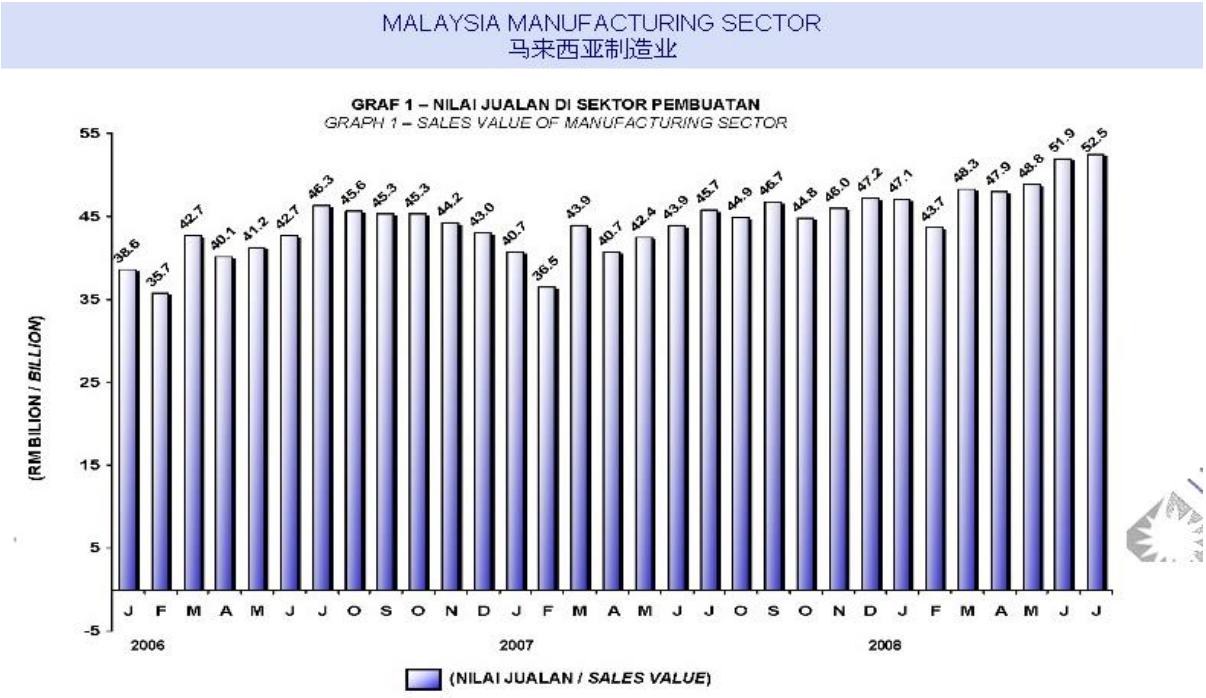

Figure 2.1
Sales Value of Manufacturing Sector, 2006 – 2008 (RM Billion)
Source: Statistic Department of Malaysia

The decrease in the sales value during the current month as compared with the preceding month was the result in the drop of the sales value of 58 industries (50.0%) out of 116 industries covered in the survey by the Department Statistics of Malaysia. The five major industries whose sales value decreased were Manufacture of Semi-Conductor Devices (21.0%), Manufacture of Television and Radio Receivers, Sound or Video Recording or Reproducing Apparatus, and Associated Goods (16.3%), Manufacture of Electronic Valves and Tubes and Printed Circuit Board (20.2%), Manufacture of Computer and Computer Peripherals (11.4%), and Manufacture of other Basic Industrial Chemicals except Fertilizers and Nitrogen Compounds (9.9%). (Department Statistics of Malaysia, 2011)

Table 2.1
Major Export in Malaysia, 2006 – 2008 (RM Million)

Items	2006	2007	2007 (Jan-Mei)	2008 (Jan-Mei)
Electrical and Electronic Products	281,017	266,454	104,084	102,497
Palm Oil and Palm Oil Based Products	32,169	45,610	14,531	26,635
Timber and Timber-Based Products	23,444	22,652	9,682	9,071
LNG	23,285	26,157	10,882	13,499
Crude Petroleum	31,967	32,863	11,912	17,920
Petroleum Products	19,038	19,730	6,840	11,731
Articles of Apparel and Clothing Accessories	10,419	10,848	4,122	4,486
Natural Rubber	8,235	7,335	2,777	3,594
Other Manufactured Goods and Articles	70,326	77,366	30,022	34,427
Other Exports	89,065	96,137	39,107	44,325
Total	588,965	605,153	233,958	268,185

Source: Statistic Department of Malaysia

The Table 2.1 show that Ten major products export to overseas which were Electrical and Electronic Products, Palm Oil and Palm Oil Based Products, Timber and Timber-Based Products, LNG, Crude Petroleum, Petroleum Products, Articles of Apparel and Clothing Accessories, Natural Rubber, Other Manufactured Goods and Articles and Other Exports. Malaysia now has an export driven economy boosted by high technology and knowledge based industries, although the emphasis is changing from pure manufacturing to higher value added products and activities as shown in Table 2.1. Manufacturing sector in Malaysia contributes almost 80 percent of overall

country's export and besides, Malaysia also known as the 17th largest exporting nation in the world. For that reason, Malaysia's firms have to work hard in order to sustain, preserve and enhance in manufacturing sector. It is stated that new products manufactured in Malaysia are accepted in developed countries such as US, EU and Japan. This shows that Malaysia manufacturing sector already achieved a level that can be proud of and it can be related with the help of new product development to maintain it for the success of its products in local and international markets.

2.2 Concept Of New Product Development (NPD) Success

Ulrike (2000) and Kotler (1991) declared that the concept of new product is susceptible to various definitions. A definition considered essential describes a new product to cover original products, improved products, modified products and new brands developed through an organization's research and development efforts. In a related classification (Petrick and Echols, 2004 and Stanton et al., 1994), there are three different categories of new products identified. Those that are really innovative, satisfying unsatisfied needs; replacement products that are significantly different from the existing one in form, function and benefits provided; imitative products new to the organization but not new to consumers.

In other concept from Ilorri et al, (2000) and Pujari et al, (2003), the new products had been described along two dimensions: 'newness to the organization' and 'newness to the markets'. Ranging from low to high on each dimension, six categories have been identified. These categories are: cost reductions; improvements in existing

products; repositioned products; additions to existing product lines; new product lines allowing a firm to enter established; markets, new to the world products that create new markets.

2.3 Critical Success Factors (CSFs) In New Product Developments (NPD)

From previous study, proficiency in new product development can contribute to the success of many companies. According to Poolton and Bar (1999), "if companies can improve their effectiveness at launching new products, they can double their bottom line. It's one of the area left with the greatest potential for improvement." In the past decades, many studies have focused on the critical success factors associated with the success/failure of new product development (NPD).

Lynn et al (1999) developed a model of the determinants of new product development success. He sent informants a series of cases and asked them to identify eleven key factors as shown in Table 2.2. Lester (1998) carried out a study and found a range of potential problems that can derail well intentioned new product development efforts. By working through these problems, he discovered the fifteen critical success factors in five areas of NPD. Poolton and Barclay (1998) identified a set of six variables that have consistently been identified in the literature as being associated with successful NPD. Cooper (2007) studied on hundreds of cases revealed what makes the difference between winners and losers on the new product development process. He extracted twelve common denominators of successful new product project and seven possible

reasons (blockers) offered by managers for why the success factors are invisible and why projects seem to go wrong, or aren't well carried out.

Table 2.2
CSFs in NPD Identified by Previous Researchers

Researchers	Critical Success Factors
Lynn et al. (1999)	-Having a structured new product development process -Having a clear and shared vision on the team -Developing and launching a product within the proper time frame -Refining a product after launch and having a long-term view -Possessing the optimal team skills -Understanding the market and its dynamics -Securing top management support for the team and the team's vision -Applying lessons learned from past projects -Securing good team chemistry -Retaining team members with relevant & experience
Lester (1998)	-Senior management commitment -The culture of the organization -Cross-functional teams -Focus on adding value to the efforts of the venture team -Provide strategy and fundamental guidelines -Share a common understanding of the process -Innovation requires expertise, skills, and motivation -Generating good ideas -Team formation events -A detailed project tactical plan -Clear goals and milestone measurements -Shift to an external focus to run the new product venture -Understanding in the venture team -Communication to management -The insight gained through reassessment efforts

Table 2.2 (Continued)

Poolton and Barclay (1998)	-Top management support for innovation -Long-term strategy with innovation focus -Long-term commitment to major projects -Top management acceptance of risk -Support for an entrepreneurial culture
Cooper (1999)	-Build in the voice of the customer -Seek differentiated, superior product -Sharp, stable, and early product definition -Build tough go/kill decision points into your process -Dedicated, supported cross-functional teams with strong leaders -An international orientation: international teams, global products -Provide training on new product management -Define standards of performance expected -Cut back the number of projects underway -Install a process manager

Source: Adapted from Hong & Wong, 2005

It can be found that the factors proposed by the four studies are not totally the same and it is hard to generate a common set of CSFs for NPD. It is even hard to generate these factors to any specific industry. In fact, there are many other studies on CSFs or drivers for NPD (e.g., Balachandra et al, 1997; Cooper & Kleinschmidt, 2007), which will not be reviewed each by each. Montoya-Weiss and Calantone (1995) reviewed 47 research studies about the determinants of new product performance and found each of these studies attempted to identify the factors that improve NPD success rates. On the other hand, each uses a somewhat different method and different factors and provides results that are useful but sometimes inconsistent with or even contradictory to other studies' results. What they share is a general focus on what is necessary for success of NPD.

2.4 Underlying theory

Ozer (2003) and Debruyne et al (2002) discussed that the new product development is indeed very important for companies. However, developing new products is a risky and uncertain process. In order to reduce the risks and uncertainties, companies need to evaluate their new product initiatives carefully and make accurate decisions. Although the outcome of a new product evaluation decision can be influenced by the environmental uncertainties that are beyond a company's control, companies can successfully improve the accuracy of their new product evaluation decisions.

Past cases suggest that firms can make two types of erroneous decisions when evaluating their new product ideas. First, they might decide to pursue a potentially unsuccessful new product idea. Second, they might decide not to develop a potentially successful new product. In either case, firm's accure big losses, while the former leads to investment lose the latter leads to missed investment opportunities. Given this background, it is clear that it is in the interests of firms to make accurate new product evaluations and critical success factors for NPD can sign a way to evaluate this process accurately (Sanders and Monrodt, 1994).

In other relevant literature what we can find are several models based on the lessons and recipes for success in the product development process. For example, Rosenau and Moran (1993) furnish a guide for success with project management tools to the product development process, emphasizing speed to market, quality management and multifunctional teamwork. Next, Bowen et al. (1994) highlights seven critical

elements that any outstanding product development project should have in common: (1) recognize and nurture the firm's core capabilities, (2) a guiding vision shared by all members in the cross-functional team, (3) project leadership and organization, (4) ability to instill the team with a sense of ownership and commitment, (5) ability to rapidly learn and to reduce mistakes and misunderstandings, (6) ability to push forward the company's performances, and (7) ability to integrate within projects following a systems approach. In other hand, Bobrow (1997) provides a list of success factors for new products, including a clear strategic direction, a corporate culture aligned behind new products, a sensible allocation policy of resources and people, and a cross-functional team dedicated to the new product development process.

Beside this, Chorda et al (2002) state that top management support, NPD process and analysis of market requirements are key success factor for NPD. In the view of Gonzalez and Palacious (2002) critical success factor are top management supports, nature of market, and product quality, supplier and costumer involvement in design process. According to Varela and Benito (2004), management emphasis, experience in NPD, centralization, novelty, NPD process style and technical activities are important factors to achieve successful NPD.

In addition, many of these studies report the presence of common success factors. In a review of some of the most important studies, some of the most critical determinants of new product success have been selected.

2.4.1 Overview of Baseline Study

A baseline study simply defines the 'pre-operation exposure' condition for the set of indicators that will be used to assess achievement of the outcomes and impact expressed in the programme's logical framework. When compared with the condition of the same indicators at some point during implementation (mid-term evaluation) and post-operation implementation (final evaluation), the baseline study forms the basis for a 'before and after' assessment or a 'change over time' assessment. Without baseline data to establish pre-operation conditions for outcome and impact indicators it is difficult to establish whether change at the outcome level has in fact occurred.

2.4.2 The Applying of Baseline Study

In relation to the cycle, a baseline study should be conducted prior to the onset of operation activities in order to establish the pre-operation exposure conditions of the outcome and impact level indicators. However, it is not uncommon for baseline studies to be conducted after activities have already begun. It should be noted that, for most operations, there is a delay between WFP‟s output delivery activities and their measurable effect on outcome and impact performance indicators. As a result, baseline studies will still provide an accurate estimate of pre-operation conditions even after the operation has begun, as long as the outcome and impact performance indicators have not yet been affected. However, this time lag varies from a few days to a few months, according to the type of operation and the environment in which it is being implemented.

For many operations it is difficult to estimate exactly how long this time lag will be. Delays in conducting baseline studies, especially when an operations activities have already influenced the outcome and impact performance indicators, are costly and likely to lead to an underestimation of the operations overall impact. WFP operations should therefore aim at conducting baseline studies before operation activities begin.

When this is not possible, baseline studies must take a high priority and data should be collected very close to the beginning of the operation, at the latest. In some cases when a baseline study has not been conducted, evaluators find themselves attempting to establish the change over time at the mid-term and final evaluations without the benefit of knowing the pre-operation conditions of the key indicators of interest. Retroactively constructed baseline conditions (a much weaker evaluation design) should only be used in situations where baseline data have not been collected and no other choice is available.

2.4.3 Purpose of a Baseline Study

Usually an activity design requires the delivery organization to undertake a baseline study of the activity's situation shortly after implementation begins. The purpose of the study is to provide an information base against which to monitor and assess an activity's progress and effectiveness during implementation and after the activity is completed. The study is usually designed and undertaken in close consultation with partner government authorities, as it must meet their needs as well as the needs of the Australian Government and the delivery organization. Being effectively the first step

in the activity’s monitoring and evaluation system, the baseline study is an early element of the activity monitoring plan. This plan, which reflects the logframe‟s levels of desired achievement or hierarchy of objectives, includes indicators of achievement and means of verification.

The baseline study gathers the information to be used in subsequent assessments of how efficiently the activity is being implemented and the eventual results of the activity. (Note that these 'results' include all effects, achievements, benefits, outcomes and impacts of the activity - which are all concepts widely used in development cooperation.) The monitoring of activity progress, which also gathers and analyses data using the logframe, will be consistent with, but will not repeat, the baseline study. Mid-term reviews, project completion reports and other evaluations will judge progress largely by comparing recent data with the information from the baseline study. A needs assessment study, which collects information during the design of an activity, is not a baseline study and this guideline does not address the requirements of needs assessment studies. The focus of this guideline is socioeconomic baseline studies, which are not a substitute for, but a complement to, physical science or environmental baseline studies in many activities.

2.4.4 The Necessary of Baseline Study

Most activities will require a baseline study. However, for a major activity that will be designed during its inception phase, it might be preferable to collect baseline data on a rolling basis. For activities that are small-scale or of a short duration, a baseline

study is unlikely to be warranted. Sometimes the data needed for a baseline, against which to measure the degree and quality of change during an activity's implementation, will already exist. In such cases the only task is to collate the data and ensure that it can be updated in the longer term. So it is important to find out what information is already available.

But more commonly, there will not be any existing data, or it will be incomplete or of poor quality, or it will need to be supplemented or further disaggregated. For example, data related to gender and other marginalized groups often need to be disaggregated for an adequate initial poverty analysis. A baseline study will help to overcome these shortcomings. Wherever possible it should maximize the use of existing good-quality local data. The only new data collected should be for monitoring the quality of activity implementation and measuring the development results. If that information will not be used (or subsequently replicated), the need for a baseline study should be seriously questioned.

A baseline study should meet the needs and interests of key stakeholders. If it does not, the study is either unnecessary or the approach should be reconsidered. If the baseline information will satisfy the needs of only one stakeholder or group, it is likely that the relevance of the study needs to be broadened.

2.5 Theory of Innovation and New Product Development

Many scholars could not deny that innovation influence product development. It is perceived as a critical source of competitive advantage and thus, has gained widespread attention from academicians and practitioners. They studied innovation in a variety of contexts including in relation to the business development, technology, policy design and social systems. Despite thousands of researches on innovation has been published, its relative importance and their relation with performance remains unclear and underexplored. This section will start with in depth discussions of innovation.

Before discussing the term innovation capability, it is better to understand the term innovation. Innovation has been defined in several different ways by scholars and practitioners. A Google search on the term using the keyword ‘innovation’ produced thousands of definitions. Innovation is originated from the Latin word *‘novo’*, meaning ‘to make something new’ (Sam et. Al, 2010) illustrated the origin of the word innovate and innovation as shown in Figure 2.2.

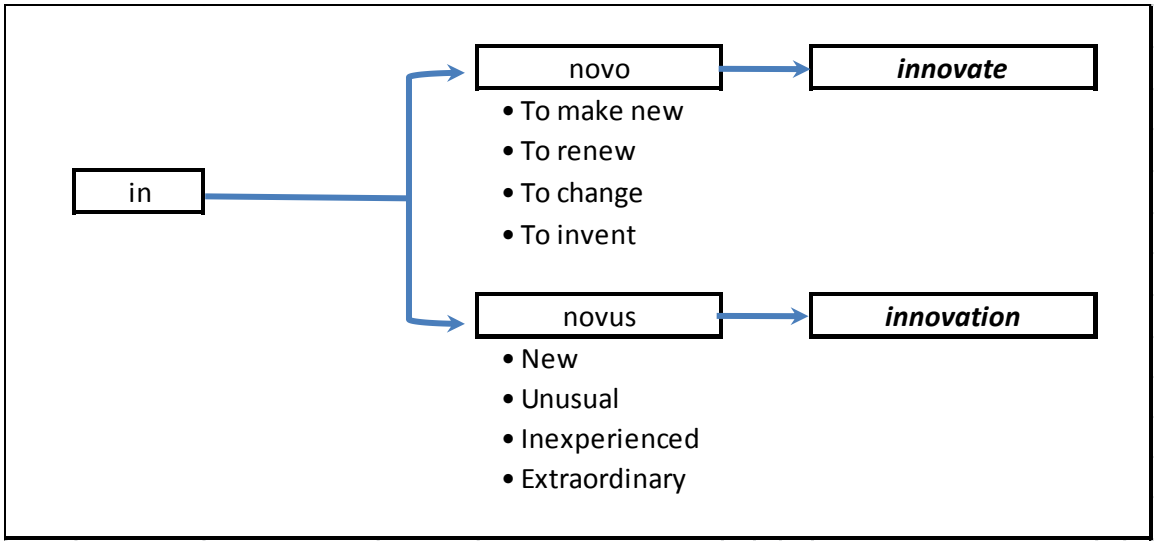

Figure 2.2
Origins of the Word Innovation
Source: Felekoglu (2007)

Innovation refers to new outcomes either incremental or radical generated from implementation of creative ideas. From previous literature, Joseph Schumpeter was the first scholar who coined the concept of innovation as 'gales of creative destruction' (Felekoglu, 2007). According to Schumpeter, innovation is reflected in novel outputs which are different from others.

Following this concept, Drucker (2000) defines innovation as an outcome of an innovative process or to the innovation process itself where it involves a process of identifying opportunities and turning them into working ideas. Crossan and Apaydin (2010) define innovation as 'production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products, services, and markets; development of new methods of production; and establishment of new management systems'.

Innovation promotes critical thinking which generate creative ideas and explores the possibilities of implementation of those ideas (Waychal et. al, 2011) involves the adoption of an idea, process, technology, or product into commercial values. Innovation may result from R&D activities in the form of product innovation or it can appear in the form of a new process with accompanying models. In addition, innovation implies invention plus exploitation which produces value. Innovation needs to be realized and possess the economic benefits to be perceived as innovation. In contrast, an invention without commercial value is not considered as innovation. Also, new ideas which are not useful is not innovation; they are called mistakes (Van De Van, 1986).

2.5.1 Innovation capability in New Product Development

Here are various definitions in the literature on innovation capability. Browsing from previous articles, some researchers referred innovation capability as innovation or innovative organization or innovativeness. The difference is found exists only in term of different sets of measurement approaches (Kumar & Che Rose, 2010). For this study, the researcher defines innovation capability as the ability of a firm to transform an idea into a something new which carries an economic value. The process to transform the idea is determined by the resources available, which refers to both tangible and intangible assets. Here, tangible assets refer to fund and technology infrastructure whereas intangible assets refer to intellectual capital. These resources are used to build up firms' capacities to produce new product and services, exploit new market and create a new way of doing business.

According to Ngah and Ibrahim (2011), innovation capability refers to 'a firm's ability to generate knowledge in the form of intellectual property such as a pattern'. Laforet (2011) refers innovation capability as 'availability of resources, collaborative structure and process to solve problems'. Table 2.3 illustrates the definition of innovation capability captured from different authors.

Table 2.3
Definition of Innovation in NPD

Author (Year)	Definition of Innovation Capability
Francis (2005)	An organizational property that underpins an ample flow of multiple, value-creating and novel initiatives.
Akman and Yilmaz (2008)	An important factor that facilitates an innovative organizational culture, capabilities of understanding and responding to the external environment and characteristics of internal promoting activities
Elmquist and Le Masson (2009)	Consists in generating new ideas and knowledge to take advantage of market opportunities.
Terms and Terminologies on Innovation (2009)	The capability to generate new ideas which lead to higher performance, create new opportunities, increase future capacity, technological leadership as well as increased knowledge base through managing technological changes.
Wonglimpiyarat (2010)	The ability to make major improvements and modifications to existing technologies, and to create new technologies.
Laforet (2011)	Availability of resources, collaborative structure and process to solve problems.
Withers, Drnevich, and Marino (2011)	The degree to which a firm possesses resources and capabilities presumed necessary for innovation.
Ngah and Ibrahim (2011)	A firm's ability to generate knowledge in the form of intellectual property such as a pattern.

Innovation involves the process of identifying and matching external opportunities with internal opportunities in order to deliver new superior product and explores new markets (Ibrahim et. al, 2009). Elaborating this point further, innovation must imply newness and it is subject to the question what is new to everyone (Kamukama et. al, 2010; Massa & Testa, 2011). In the context of newness to the firm, discussions may vary in terms of newness to the market and newness to the industry (Johannessen et. al, 2001). New to the firm implies innovation that was not produced by the firm before where as new to the industry implies innovation that offers new value and benefits to customers.

On the other hand, capability has much to do the ability of a firm to generate and develop ideas and create opportunities which will guarantee the firm's product future undertakings. Capability is 'the processes and functions that enable a firm to deliver high quality product and services with speed, efficiency and high customer service (Allee, 1999).

Makadok (1998) defined capabilities as 'a specific resource type that serve the purpose of improving productivity of the other resources of the firm'. It is through capabilities that enable firms to create value and stay competitive. Difficulties associated with replication make capabilities a critical ingredient for a firm's survival. Nothnagel (2008) further added that there are five subcategory of capability namely technological capability, organizational capabilities, R&D capabilities, manufacturing capabilities, marketing capabilities, competitive capabilities and learning capabilities. Given the importance of innovation capability to a firm's position in a market place, this section

will identify factors that drivers firms to innovate. Before that, the researcher will elaborate on the types of innovation and the degree of innovation.

Referring to previous studies, some researchers divided innovation into two types, namely product innovation and process innovation whilst some others added organizational innovation as another type of innovation. OECD (2005) distinguishes innovation based on four types, namely product innovation, process innovation, marketing innovation and organizational innovation. For this study, the researcher distinguises innovation capability by on the five types of innovation, namely product innovation, market innovation, strategic innovation, process innovation and behavioral innovation; sharing the same view with Wang and Ahmed (2004); and Ibrahim, Zolait and Subramanian (2009). The definition of each type of innovation is as follows:

2.5.2 New Product Development Innovation

Product innovation is defined as 'the market introduction of new goods or services or significantly improved good or services with respect to its capabilities, such as quality and user friendliness' (Malaysia Productivity Corporation, 2009). It is a means for generating revenue through safeguarding and improving quality as well as for saving cost (Ojasalo, 2008).Neely, Filippini, Forza, Vinelli, and Hii (2001) mentioned that product innovation includes changes to design, components and product architectures. It is also known as service innovation and represents the end product offered by a firm. Referring to past studies, researchers measured product innovation using a number of

indicators such as a number of patents, a number of new products and a number of registered trade mark.

Process innovation is defined as 'the use of new or significantly improved production process, distribution method or support activity for its goods and services' (Malaysia Productivity Corporation, 2009). It refers to an improvement of process flow or the introduction of a new process flow from an original process into a usable technique and reflects changes in the way firms produce end products. Neely et. al (2001) further divided process innovation into information technology innovation and manufacturing technology innovation. Examples of process innovation are the introduction of a new system for handling payment or the implementation of new strategies to penetrate new markets.

Organizational innovation refers to 'the implementation of a new organizational method in the firm's business practices, workplace organization or external relations' (Felekoglu, 2007). It involves application of new or significant changes in a firm's structure or management method. Organizational innovations are likely to reduce administrative and transaction costs, improving workplace satisfaction, gaining access to non-tradable assets or reducing cost of supplies (OECD, 2005).

2.5.3 Strategic Innovation and New Product Development

Strategic innovation is 'the creation of growth strategies, new product categories, services or business models that change the game and generate significant new value for

consumers, customers and the corporation' (Palmer & Kaplan, 2012). It takes place when firms identify gaps in the market place and make plan to fill the gaps so that they will create value. Wang and Ahmed (2004) added that strategic innovation focus on matching the organizational objectives with existing resources in order to leverage limited resources creatively.

Behavioral innovation refers to underlying construct that reflect the 'sustained behavioral change' of an organization towards innovation (Avlonitis, et. al, 1994). It involves a willingness to change of individuals, teams and managements that enable the formation of an innovative culture, the overall internal receptivity to new ideas and innovation (Wang & Ahmed, 2004).

The degree of innovation is based on the magnitude of innovation which is classified into two; incremental innovation and radical innovation (Subramaniam & Youndt, 2005; Lin, et. al 2010)**.**The researcher defines incremental innovation asa significant extension of existing products or process characteristics either improvement or refinement of the product or process. Subramaniam and Youndt (2005) defines it as the capability to generate innovations that refine and reinforce existing products or services. Incremental innovation involves a process of improving performance and function of current product, services or technology (Lin, Chen, & Chiu, 2010). It attempts to meet the demand of customers in a marketplace by making minor changes to products or services and modifying existing functions and practices.

On the other hand, radical innovation refers to the outcome of totally a new product or process into the market. Subramaniam and Youndt (2005) defines radical innovation as the capability to generate innovations that significantly transform existing products and services**.** It involves a lengthy process of learning, networking, knowledge creation and gathering (Alsaaty, 2011) and is based on proprietary technology and R&D.

Radical innovation will only refer to something which is significantly new to the world. It exhibits a high degree of newness offer entirely new performance features. Radical innovation operates in unfamiliar technology and business domains relying on emergent or undeveloped knowledge (Kelley et. al2011). The success of radical innovation relies on the ability to create new knowledge and making the old one obsolete, thus involving fundamental change in a firm (Subramaniam & Youndt, 2005).

The differences between two are radical innovation draws upon transformed prevailing knowledge, with innovations making prevailing technologies obsolete and morphing out old knowledge into something significantly new whilst incremental innovation draws upon reinforced prevailing knowledge, with consequent innovation taking advantage of and improving upon prevailing knowledge (Subramaniam & Youndt, 2005)**.**

In addition, firms with high quality of intellectual capital possess higher capability of producing radical innovation than those with low quality of intellectual capital. This is based on the fact that producing a totally new product requires high degree of new knowledge with major improvement. It opens up new technological

trajectories and initiate new growth industries compared to the latter which occurs within technological trajectories and industries (Kleinknecht & Mohnen, 2002).

Moreover, the level of ambiguity and risk are higher for radical innovation compared to incremental innovation. It requires huge capital investment and the probability to succeed in producing a new product with commercial value is not guaranteed. Therefore, it requires empowerment to drive a firm to move for radical innovation (Kelley et. al, 2011).There is a growing number of studies which have been conducted to determine what drives innovation. This is due to the perceived benefits gains from innovation activities on product performance (Rhee et. al, 2010).

Products are becoming more homogeneous in a competitive market where the number of competitors is increasing. Hence, the need for firms to come out with a new superior product which is different and unique from others rises. In order to do so, firms have to practice continuous innovation and promote new product innovation culture. This is because being innovative will generate the capability to turn ideas into something which have value.

Market needs are changing due to the changes in demographic, preference, technology and cultures. These changes have created gaps in the form of new product that market needs. The phenomenon drives firms to innovate where they will search and turn the gaps into market opportunities.

The business landscape continues to evolve with increasing competition both in the domestic and international market. In order to stay ahead and be successful in a competitive market, a firm should be able to determine perception, wants and needs of the market so that it can innovate and create superior products which are different from others. The better the capability of a firm to innovate, the greater a firm distinguishes its product and the greater the firm position itself amongst its competitors.

In addition, firms can no longer depend their business merely on domestic market. They need to seek opportunity and compete in the global marketplace. In order to compete in the global competition, producing new product is paramount. Other than enjoying lower cost (Neely et. al, 2001) and increasing productivity (Alsaaty, 2011), innovative firms are capable of introducing or improving new products or processes; define and redefined the firm or product positioning in a new market place (Francis, et. al 2002).

Kleinknecht and Mohnen (2002) added that innovation enhances demand. As the researcher mentioned in the previous section, new product produced need to have a commercial value to be considered as innovation. Thus, firm has to produce superior product which Prahalad and Hamel (1990) characterized it as having considerable benefit, competitively unique and difficult to imitate from the customer's perception. Superior product would then drivespeople to buy the product. Some may even willing to pay extra to own it. As a result, the firm's sales will increase indicating profit gain and a better position amongst its competitors.

Furthermore, previous studies revealed that innovation has its own objective which is to create value (Waychal et. al, 2011) and increase performance and growth of an organization (Rujirawanich, et. al, 2011). These objectives will drive a firm to a better position and a better result. For instance, Bigliardi, et. al (2011) highlighted the characteristics of SMEs belonging to the Italian Manufacturing Sector. They found that innovative firms are market anticipation and customer focused aiming to produce superior products.

Finally, innovation drives knowledge to evolve. In this case, along the process of innovation, firms will require knowledge and create new knowledge. Choo, Linderman and Schroeder (2007); and Eisenhardt and Martin (2000) shared the same view when they coined that innovation promotes the creation of a new set of knowledge for future innovation. Rothaermel and Hess (2007) further added that innovation drives continuous changes in product and process that build competitive advantage over time.

As product innovativeness is generally considered a prerequisite for a firm's success and survival, and being the key drivers of firm’s long term success in today's competitive market, firms are seen searching ways to enhance their ability to innovate. In order to do so, firm need to manage innovation effectively. Thus, next section will discuss on ways of managing innovation.

An issue related to the firms’ new product innovation capabilities has gained attention from researchers due to the fact that it provides firms with sustainable competitive advantage (Coombs & Bierly, 2006). They perceived that in order for firms

to remain competitive, continuous new product innovation is paramount to create new advantages and value. Realizing this, firms need to know how to manage innovation so that they will be able to innovate. Hence, the researcher will unpack each aspect of managing innovation in more details in the following.

The capacity of a firm to innovate depends on the quality of intellectual capital its possess. Laforet (2011) shared the same view and mentioned that innovation prevails only when there is a capacity of a firm to innovate. Subramaniam and Youndt, (2005); Nonaka and Takeuchi (1995); Menor, Kristal, and Rosenzweig (2007);and Ngah and Ibrahim (2009) added that innovation capability of a firm is closely depends on its intellectual capital or ability to utilize its knowledge resource. Thus, the ways of managing intellectual capital are also considered as the ways of managing innovation capability which were mentioned in the previous section. Amongst them are learning and training, securing non-disclosure agreements or secrecy agreements with the employees, registration of patent, documentation of the work process, and establishment of norms that facilitate interaction, relationship and collaboration with external parties. Managers may implement them to enhance innovation capability of their firms.

Proceeding further, rates of innovation will continue to increase due to social change, competitive challenges and technological development. As competition became increasingly intense, firms need to create an environment that allows innovation to flourish. In other words, firms need to establish innovation culture. It stresses on having the relevant knowledge and rewards system that can motivate employees to participate in the innovation activity (Alsaaty, 2011). Since there is a link between motivation,

rewards and culture, firms may apply any management theory to promote innovation culture.

For instance, a well-known theory of human motivation, Theory X and Theory Y developed by Douglas McGregor could be used to motivate employees to innovate, consequently promotes innovation culture. According to Theory X, if employees dislike work they must be forced to do their job(Ferrell et. al, 2006). It suggests that employer have to punish them to make them perform in their work. Punishment may be in the form of salary reductions, giving no annual bonus or taking away fringe benefits.

Unlike Theory X, Theory Y assumes that employees will seek out responsibility in an attempt to satisfy their social, esteem, and self-actualization if they like to work(Ferrell, Hirt, & Ferrell, 2006). It suggestsemployers to give equitable rewards to the them based on their performance. Equitable rewards will create job satisfaction and then encourages them to work towards achieving the firms' goals because they become more interested in their work and felt proud to be a part of the firm. Mohamed (2002) shared the same view as he concluded in his study that job satisfaction has a relationship with innovation.

In addition, firms should avoid a work culture that consists of formalized rules and procedures which may hinder the performance of innovation. Innovation tends to flourish if employees are given free communication to ask questions, seek feedbacks, or propose new ideas. When team members freely communicate with each other at any time and any place, the tendency to obtain and integrate tacit knowledge amongst them

is high. Penalties for rule violations or being judged negatively for proposing an opinion will make employees become more averse to risk, thereby giving up searching for new ideas, being creative or trying new approaches. In this case, research evidence by Mosey, Clare and Woodcock (2002) proved that an employee suggestion scheme and a new product development team facilitate new product development project which consequently determine the innovativeness of a firm.

Furthermore, Schiling and Phelps (2007) found that the greater the number of organizations with different backgrounds involved in an innovative project, the more variance in ideas and more amount of knowledge those organizations generate. Firms must therefore build a work culture that promotes sharing of ideas not only with employees in the firm but also with the outsiders. This is because any effort that enhances connectedness in the work culture is perceived to have impacts on innovation.

Connectedness refers to strong ties. High level of connectedness promotes openness (Jansen, Den Bosch, & Volberda, 2006) and result in better ideas and feedbacks. In order to increase the level of connectedness, firms may organize workshops as they allow individuals and teams to experience new ways for innovative team works promoting new collaborations in cross functional area. It is also an effective way to identify areas of innovation opportunities, facilitate the sharing of knowledge and turn it into visible outcomes.

Moreover, establishing good networking with external sources is paramount. The rationale is that networking provides sharing of useful information concerning existing

and potential opportunities that push firms to innovate(Alsaaty, 2011). Firms which are part of a network is likely to have access to resources than firms operating outside the network. Wincent, Anohkin and Biter (2009); and Subramaniam and Youndt (2005) shared the same view when theyreported that networking with outsiders such as customers and suppliers is found to have a positive impact on firm's innovation activities through the exchanging resources and ideas.

For example, Intel, a high-tech firm gained ideas to create innovative product from its loyal customers through complaints and sharing of thoughts (Brooking, 1996).Another study conducted by Adler (1995)found that manufacturing related suppliers developed creativity of the R&D parties by giving them direction to match the new ideas with the existing manufacturing technology requirements.Also, few related studies concluded that it is important for small organizations to know their customers so that they will able to develop strategies that will increase the loyalty of their customers (Dessi & Floris, 2010; Kumar & Antony, 2008).

Proceeding further, R&D facilitates innovation activities in a firm because it is impossible for a firm to innovate without a R&D facility or laboratory.Al-Kazemi (2009) coinedthat R&D and patent demonstrate an input/output relationship. Hall, Thoma and Torrisi (2007); and Al-Kazemi (2009) added that patent is the successful outcome of R&D that determines firm performance. In relation, Osma and Young (2009) revealed that firms spend on R&D to meet their earnings expectations. They concluded that firms will increase R&D spending when they expect it will result high earnings.

Finally, the researcher agreed with Oke, Burke and Myers (2007) that the government initiatives are important to encourage SMEs to innovate which consequently improve growth. This is proven when Sebora, Lee and Sukasame (2009) found that the government support programs such as low interest loans, counseling on government regulations, legal expertise, and other support services have enriched entrepreneurial activities in Thailand. Abdullah (1999) further distinguished five areas of the support programs for SMEs in Malaysia. Amongst them are financial and credit assistance; technical and training assistance; extension and advisory services; marketing and market research; and infrastructure supports.

2.6 Training and Product development Success

Training has become a key element in a far – reaching process of restructuring which is currently under way in the industry (Dankbaar, 1999). Attention is paid to the training issues, as it is a significant variable in the "franchise package" which is provided by the franchiser to the franchises, and through the literature proves to be a determining sources of power possessed and employed by the manufacturer/ franchiser over the dealer/ franchises.

Training has been researched as part of the assistance" or "general support" provided by the manufacturer, but not as a factor in its own right (Marie-Raphaele Davey-Rafer, 1998). A more general attribute of which training is a part is "assistances" (Etgar, 1976; Hunt and Nevin, 1974; Lusch, 1976, 1977) or "franchise support"(Anderson & Weitz, 1992; Stanworth, 1985) or "role performance"(Frazier &

Summers, 1986 ; Gassenheimer, 1989) or “idiosyncratic investments”(Anderson and Weitz, 1992). Emperical evidence suggested the notion that training is perceived to be one of the main benefits of the franchise package (Izreali, 1972; Mendelsohn, 1985).

Studies of UK engineering employers (MacNeil, 2000; Mason 1999; Melia, 2001) have highlighted significant gaps between the current skills of the workforce and the skills required to meet business objectives. In addition, the attraction and retention of skilled staff has become more problematic, some employers reporting that their commercial prospects are being limited by this factor (Marsh, 1999). Many employers have realised that competing on cost alone is impossible, resulting in a drive for competitive advantage through quality, niche production, diversification and improved customer focus (MacNeil, 2000).

People are the most important asset. At few facilities has the commitment been based more solidly in the sincere trust and belief in its people. This commitment in turn provides the basis for the company’s assertion that any product can be made “best in class” with the right “people” approach. Companies also committed to long-term improvements instead of looking for quick gains. Because training and support for the associates is a critical aspect of its business, some companies consistently invest up to seven percent of payroll toward training and education. The dedication of these assets helps ensure that the companies personnel are properly trained, work in a safe environment, and are dutifully rewarded for the significant number of implemented, employee-recommended process enhancement changes. The significant emphasis on

employee value, involvement, and training produced significant returns and benefits for the company.

The process of change has placed increasing pressures on the skills base of the current workforce, already considered to be an obstacle to business development and sustained competitiveness in the sector (Mason, 1999). These skills shortages have been identified, principally by employers, as greatest in associated professional and technical occupations. They include key skills relating to the use of information and communications technology, problem solving, communication and general business, as well as more specialist programming and electronics, process manufacturing (Prime Research & Development, 1998). At the same time, national surveys of employees have revealed that in general they perceive they have necessary skills, suggesting a skills perception gap(Performance and Innovation Unit, 2001; *Road Haulage and Distribution Training Council Report*, 2001)

Yet, if training is perceived as critical, why is investment in training and development seen as a relatively unimportant factor in helping companies adapt to change? (Dufficy, 2001). Training is seen as the most important factor which clearly have competency (and thus training and development) implications. Companies see the need for leaders who can embrace and cope with changes and are comfortable with ambiguity, in situation where there are no right answers and so they must try things out and expect to make mistakes along the way, rather than simply copying established methods. Similarly, as hierarchies disappear, relationship-building and coaching skills

take the place of the power of authority and, once again, training to develop these focuses on personal competencies rather than functional skills. (Dufficy, 2001).

This study attempts to investigate whether training moderates the relationship between manufacturing practices and knowledge and learning on manufacturing capabilities of the automotive assembler. The focus is on the training for new work structures in production, research, development and engineering, the global corporation ,training for co-makership and lastly new methods and approaches for learning-while-working. All this dimensions were the establish dimensions that had been used by practitioners.

Training for new work structures divided to three categories. First, training for work structures in production. Secondly, training for work structures in research, new product development and engineering. And training for work structures in the global corporation. New work structures in production are characterized by introduction of various variants of teamwork, job rotation and multiskilling, the transfer of inspection, and maintenance task. Technological change is continuous, but the skills that had been applied as same as before. Training for new work structure focuses to the basic skills (reading, writing, etc., leader training, life skill problem solving, product knowledge, quality skills and technical skills (Saunders, 2000).

2.6.1 Training for Co-Makership

The tendency to increase outsourcing of parts and components involves more than a simple change in the balance of make-or-buy decisions. Responsibility for the development of a growing number of product components is also shifting from the manufacturers to the suppliers. Close co- operation with, and indeed membership of, the product development teams of the manufacturers is necessary. Training for co-makership included whether the individual can master several skills, can cope new process and new product technology, can function as team members, can contribute and adopt new form of leadership, effects and specialize in product development department, can improve communication between product development and product department, new attitudes, new methods of international communication and new capabilities (product knowledge, cultures, and language), can put into practices the concepts of strategic sourcing and can develops a structural towards continuous improvement process which support strategic sourcing (Bolden, 1997).Based from above diacussion we proposed a proposition that training is positively related to new product development success.

2.7 Internal/External Support and Product Development Success

Lack of internal support is also a critical organizational barrier to product development success (Mirani & King, 1994). Internal support focuses on developing the ability of the workers to interact with product development. Internal support is dependent on the careful management of such activities as training, on line support and

software upgrading, (Igbaria & Chakrabarati, 1990; Amoroso & Cheney, 1991). As a result, internal support can motivate favorable attitude and motivate. product development. The internal support includes assistance from knowledgable individuals and experts who will assist when there is system breakdown or expert advice on system implementation. The internal support includes training provided by vendors or suppliers to the organization. Additionally, high levels of technical support are thought to promote more favorable beliefs about technology acceptance among users and information system specialists will promote greater product development success (Lucas, 1978; Igbaria et al. 1995).

Bergeron and Berube (1988) studied the adequacy of management and support practices of product development in thirty-one organizations. The study revealed that external support was positively correlated to the availability of a "hot – line" to provide technical support to solve user's problems, along with the existence of an information center to support end user activities. Rivard and Huff (1988) also surveyed 272 end users and found that quality of internal support is the construct most closely related to attitude toward product development. Govindaraju and Crews (1997) also carried out survey of one hundred and eight end users and found that general support and information support are positively related to product development. Amoroso and Cheney (1991), concluded that perceived organizational (internal computing support) support for end user application development is associated not only with motivation to develop application but also with computer attitude and end user application development outcomes.

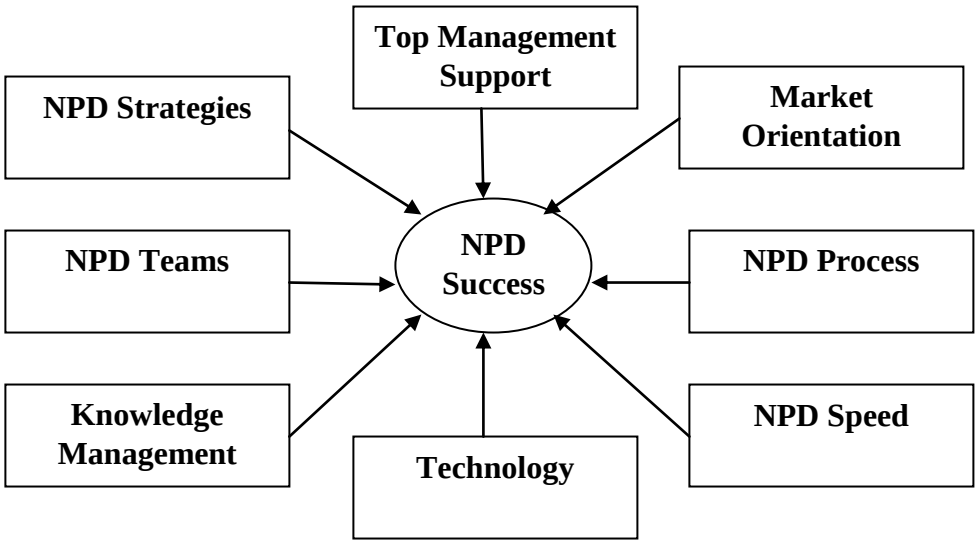

Figure 2.3
The Original CSFs in NPD Model
Source: Adapted from Gonzalez and Palacious, 2002

In this study, we use the supporting theory as shown in NPD model as shown in figure 2.3 above as our underlying theory.

2.8 Theoretical Framework

Based on the above discussion about the model of critical success factors in new product development (NPD), this study proposed the following research framework as shown in Figure 2.4.

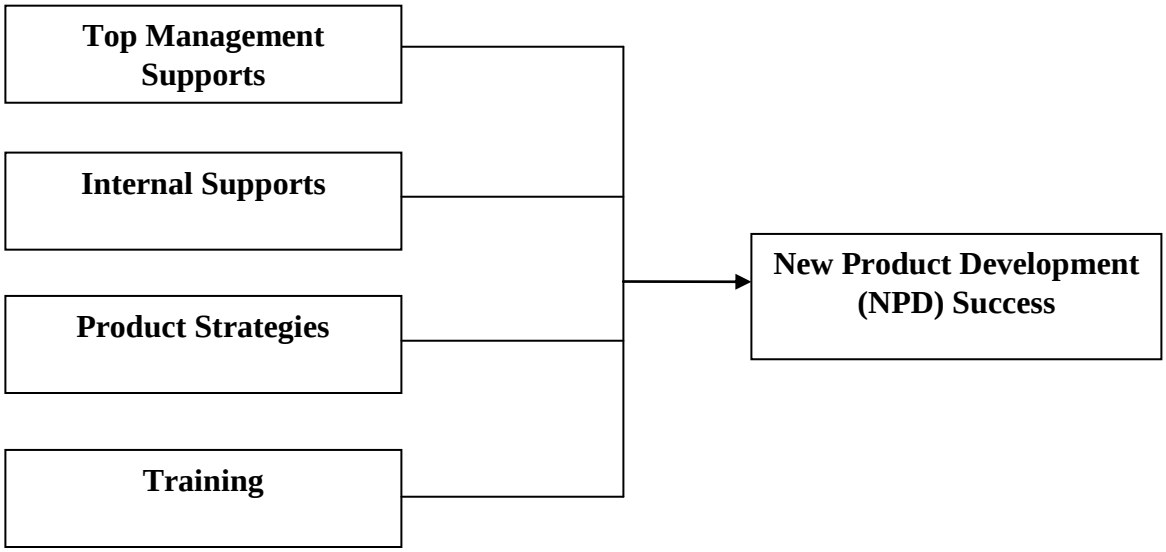

Figure 2.4
Research Framework of This Study

The theoretical framework gives an overview in achieving the critical success factor in new product development. This study will show that there are four variables that are interrelated in a process to make the new product development successful. There are four independent variables which consist of top management support, external support, new product development strategies and new product development teams. Meanwhile the dependent variables consist of new product development success. This is a single model which to identify the critical success factors in new product development for Malaysian manufacturing industry.

2.9 Criteria to Measure the NPD

Cooper (1979), Maidique and Zirger (1984) agree that the research into new product success is still in a beginning state, despite the research effort that has been

devoted to NPD over the last three decades. A fundamental problem when measuring new product success is the meaning of such success, as it has not been well defined. The interpretation of success is affected by the interest groups involved in NPD such as R&D, marketing, and production. Hence, success can be a value-laden concept. These problems have been aggravated by the fact that little theoretical work has separated success indicators and determinants. For example, is customer acceptance an indicator or a determinant of new product success? Moreover, the existence of different levels of indicators (e.g., project, program, and company) and multiple types of indicators or determinants has complicated the use of success measures. The time perspective of new product success also increases the difficulty of selecting relevant and meaningful measures.

NPD research has often measured new product success opportunistically. That is, some researchers have operationalised success based on the availability of data. This has resulted in a number of suggested success measures (Cooper & Kleinschmidt, 1993). In addition, most suggested measures are noncumulative and atheoretical, making comparisons difficult or impossible. This may be because a new product's impact on an organisation can be multilevel and multidimensional (Cooper & Kleinschmidt, 1987), complex and dynamic (Hart, 1993), subtle and, sometimes, only perceivable in the long term (Maidique & Zirger, 1984).

One approach to tackling the problem of conceptualising success is to derive its structure in terms of levels and dimensions. Several studies have used a ''what's there'' approach to derive new product success dimensions, either conceptually or empirically.

For example, Cooper and Kleinschmidt (1987) empirically identified three new product performance aspects, which they termed ‘‘financial performance,’’ ‘‘market impact’’ and ‘‘opportunity window’’ dimensions. These three dimensions are project-level factors that describe the financial success of a new product, the extent to which a new product presented new opportunities, and the impact of a product in its marketplaces.

Hart (1993) argued that both financial and nonfinancial success measures can be used, as can direct and indirect measures. She identified three project level success dimensions, which she termed ‘‘beating the competition technologically,’’ ‘‘beating the competition to market,’’ and ‘‘providing a technological breakthrough.’’After reviewing new product success research, Hauschildt (1991) suggested that success could be measured from both technical and economic perspectives and that multiple criteria were needed if acorrect assessment was to be made.

While a large number of success measures have been used, two consistent perspectives have emerged. Many researchers have argued that new product success should be measured using multiple criteria and that success can be gauged at different levels. The most widely used success measures have been developed at a project level, although it has been recognised that such measures can also be examined at an organisational level. However, a crucial question remains as to the measures that should be used to capture the various criteria.

2.10 Relationship of Variables

There are three independent variables and one dependent variable in this study. The independent variables are top management support, internal and external supports, product strategies and training while the dependent variable is new product development (NPD) success.

2.11 Top Management Support

Malcolm Baldrige criteria highlight the importance of leadership. Leaders must pay attention to developing the "right" corporate culture. That the order, rules, and regulations, along with uniformity take second place to achieve the goals. The strategic focus moves away from stability, predictability, and smooth operations toward a search for value added. It is emphasized that without management commitment, improvement efforts fail. This commitment must be not only active, but also visible. The intent is to develop leadership that is open-minded, supportive, and professional (Spivey *et al*, 1997).

NPD is an uncertain process with different people and departments having different perspectives about how things are to be done. It is therefore a political process involving struggles for resources, influence and power which can generate conflicts. Atuahene (1997) confirmed that this conflict only is able to cope with top management decisiveness. Several works documented that top management initiative and support is a key aspect in order to achieve new product success (Zirger and Maidique, 1990; Chorda

et al., 2002; Varela and Benito, 2004). Management commitment provides organizational support for change, generates enthusiasm, provides a clear vision of the product concept and assures sufficient allocation of resources (Poolton and Barclay, 1998: Clarck and Fufimoto, 1990).

Strong leadership style by the top management is necessary for the successful implementation of NPD projects. Usually the top management has a great deal of responsibility but does not have the appropriate authority as a line manager whereas the line manager has a great deal of authority but only limited project responsibility. Considering this fact, it is consequently important for a top management to maintain a leadership style that adapts to each employee assigned to the project. This is further complicated by the fact that the top management does not have sufficient time to get to know all the people.

For top management supports, this study will use leadership style, necessary resources and authority power, clear vision of the product concept, organizational support for change, communication and generate enthusiasm to measure this variable.

(H1: There will be positive relationship in top management supports to NPD)

2.12 Internal Supports

Gumusluoglu and Ilsev (2009) said from their journal that one important source of organizational new product development is the knowledge acquired from the firm's

external environment. Woodman et al. (1993) hypothesized that information exchanges with the environment are an important contextual variable affecting organizational NPD. Damanpour (1991), in his meta-analytical review of the organizational NPD studies, reported a positive association between external communication and NPD. Cohen and Levinthal (1990) suggested that ‘‘external knowledge might complement and leverage a firm’s own knowledge output’’ and thus be a critical source of organizational NPD.

Resource availability is another important factor in organizational NPD (Cohen and Levinthal, 1990; Damanpour, 1991). The amount of resources such as personnel and funding affect the followers’ perceptions of an environment supportive of innovation in their organizations (Amabile *et al.*, 1996; Scott and Bruce, 1994). Furthermore, Woodman et al. (1993) maintain that availability of slack resources enhances organizational creative performance. Therefore, resources obtained from outside the organization can be crucial for organizational NPD.

For the reasons previously stated firms can build a wide range of relationships with different parties. They can build strategic alliances with other companies for sharing expertise, funding, or output; they can cooperate with research institutes and universities for technical assistance and consulting; and they can receive financial and technical help from public or private support organizations for new product projects.

From the previous research, receiving either knowledge based or resource based support (i.e., technical and financial assistance) from external support is proposed in this study to interact with other innovation supporting critical factors. This might be

especially important for firms that lack sufficient internal resources. Consequently, it is proposed here that the positive impact of transformational leadership on organizational innovation depends on the degree of external support. It is expected that, under a higher level of technical and financial assistance acquired from outside the firm, the transformational leader will find more support for his or her vision, and, thereby, his or her effect on organizational NPD will be stronger.

For the external supports variable, this study will measure this critical factor by using financial help, government standard, infrastructure, collaboration with public/private institution, and customer feedback.

H2: There will be positive relationship in external supports to NPD success.

2.13 New Product Development Strategies

NPD strategies are determined within the framework of the organizational objectives, environmental factors, past and present performances, resource availability and corporate capability. Generally, three types of organization can be identified depending on the NPD strategy adopted. According to Ilori et al (2000), these are classified as reactors, planners and entrepreneurs. ‘Reactors’ wait for problems to occur (e.g., dwindling market share) before attempting a solution while ‘planners’ anticipate such problems. ‘Entrepreneurs’, however, anticipate both problems and opportunities for timely exploitation.

A simple classification gives two types of NPD strategies as either offensive or defensive (Debruyne *et al,* 200; Wilson *et al.,* 1992). The offensive strategy opens up new markets or enlarges the existing one through careful planning, whereas competitive forces or other changes in the operating environment stimulate the defensive strategist into action. An organization's continued commitment to an offensive strategy could be very expensive in terms of the high degree of risk and investment in money, skill and time, but also with a lot of potential for higher returns. This contrasts sharply with the relatively low risk/low return defensive strategy (Liu *et al,* 2004; Kim et al, 2004).

In other thought, Johne and Snelson (1990) gave two approaches in formulating NPD strategies as the traditional asset based and market-based. The components of the traditional asset-based approach are given as product cost cutting, product modification, product-line extension and new product line. These, all seeking to build on existing product lines and technical know-how, are applicable in the existing market and with greater intensity in new markets. Beyond the conventional asset-based approaches, the market-based options seek for a wider and a more profitable exploitation of opportunities with a sharper focus on potential market opportunities outside a firm's business. Considered a novel and exciting approach, it is made up of project offering, system offering, commodity offering and service offering strategies within a product support matrix. These offering strategies consider a wider numberless of benefits a product offers to specific target market, hence the differentiations in products and support as considered suitable.

Firth and Narayanan (1996) defined a NPD strategy as having three aspects: (1) new embodied technology; (2) new market applications; (3) innovation in the market. Based on these three aspects, his research lead to a NPD strategy definition, i.e. (1) innovators; (2) investors in technology; (3) searching for new markets; (4) business as usual; (5) middle-of-the-road. Beside this, Barczak (1995) divided NPD strategy into three categories based on Ansoff and Stewart's classification: first to market, fast follower and delayed entrant. Song and Montoya-Weiss (1998) utilized Ansoff's product market matrix model considering the growing in our current market and technology strategy. The results lead to incremental NPD. A development strategy that pursues a new market with a new product and technology will create a "real new product". A strategy involving a current market and new product or new market and current product is classified as a moderate innovation. Veryzer (1998) used new models with two important aspects: technological capability and product capability. Technological capability means that a product must be made using a technology beyond the current company technology level. Product capability represents the benefit of a product recognized or experienced by customers. Therefore strategies that firms follow decide to their NPD performance.

For this critical factor, the study will use product cost cutting, product modification, NPD process, information, technology capability, and specific strategy to measure the NPD strategies.

H3: There will be positive relationship in NPD strategies to NPD success.

2.14 Training

Training is commonly used to put together employees from a number of company departments and give opportunities for simplification and parallel processing. Many studies have found that this practice increases a project innovation and NPD success rate (Sanchez and Perez, 2003; Atahuene and Evangelista, 2000; Bonner *et al*, 2002; Jassawalla and Sashittal, 1998). NPD teams can take a variety of forms including teams comprised of personnel temporarily assigned to training from a firm's functional departments to develop new product. In addition, members of NPD teams frequently are organizationally linked through matrix structure to their functional departments.

Two other NPD team forms involve, first, functional specialists permanently assigned to distinct new product or new venture development groups and, second, senior managers whose primary focus makes them directly responsible for the development of new products (Millson and Wilemon, 2002; Oliver *et al*, 2004). NPD team members face the same types of challenges that all decision makers face: they are subject to judgmental biases, believe in their ability to influence results post decision, suffer from limited capacity to deal with data, are often overly ambitious, and must face the consequences of their decisions. The work is considered to be inherently challenging and often depends on making intuitive "leaps" (Cooper, 2003). So NPD teams composition and other group factors affect NPD process. Four criteria that are normally used to select NPD teams are whether they were results oriented, possessed strong interpersonal skills, their depth of understanding of the organization and lastly their commitment to corporate values.

For this variable, this study will measure it critical factor by using quality of the team, team's duties, communication, decision making, and commitment from senior managers.

H4: There will be positive relationship in NPD teams to NPD success.

2.15 Summary of the Chapter

Based on the theoretical framework, the hypotheses for this research dimensions were formulated and developed in order to test the relationships among top management support, product strategies, internal and external support in New Product Development Success and finally to achieve the research objectives.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter will highlight the method used to conduct this study including the research design, data collection, sample study, and data analysis being used to process the data collected to achieve the discussed objectives. The respondent of this research topic will be the manager's of the firm in Malaysian manufacturing industry. However, all the features and the tools that need to utilize in this study have been identify to come out with the suitable result identifying the critical success factors in new product development for Malaysian manufacturing industry.

Methodology refers to more than a simple set of methods; rather it refers to the rationale and the philosophical assumptions that underlie a particular study. This is why many scholar literatures often include a section on the methodology of the researchers. This section does more than outline the researcher's methods.

Research methodology is more than just collections of method to perform a research; it is an efficient way to solve the research problem. The research methods refer to the methods and techniques used by the researcher in performing the research e.g.

data collection techniques, data processing techniques, and the instruments (Kothari, 1995).

3.1 Research Design

There will be minimal interference as reply is obtained in a normal setting of a manufacturing organization. The study will be a cross sectional study as data shall be gathered once over a period of time from persons who work in manufacturing firms who adopted new product development in their organizations. This study shall be carried out using structured questionnaire. As stated by Sekaran (2003), questionnaire is a popular method of collecting data because researchers can gather information fairly easily and the questionnaire responses are simply coded.

According to Sekaran (2000), in survey data can be collected via several approaches such as personally administered questionnaires, mail questionnaire, and electronic questionnaire (E-mail). Bryman (1992) confirmed that the data from the survey allow the researcher to establish whether there are associations among the various variables that are reflect in the questionnaire.

A questionnaire is a reformulated, written set of questions to which the respondent records his answers, usually within rather closely defined alternatives. A questionnaire is obviously a good way to collect data when the researchers know precisely what information is needed, and the questionnaire survey method offers advantages and efficiency in data gathering (Sekaran, 2000).

Emory and Cooper (1991) point out that mail survey is typically perceived as being more impersonal, providing more anonymity that the other communication modes. Sekaran (2000) believes that the most important advantage of mail questionnaires is that wide geographical area can be covered in the survey. The research questionnaires are mailed to the respondents, who can complete that, in their own convenience and under their own levered time. However, the major weakness of the mail survey is the lack of response. Many studies have shown that better educated and those more interested in the topic tend to answer mail surveys (Emory & Cooper).

Sekaran (2000) also suggest some effective techniques for improving the rates of response to mail questionnaires such as sending follow up letters enclosing some small monetary incentives with the questionnaire, providing the respondent with self-addressed stamped return envelopes, and keeping the questionnaire brief.

When the survey is confined to a local area, and the organization is willing and able to assemble groups of employees to respond to the questionnaire at the workplace, personally administering the questionnaire is a good way to collect data.

The main advantage of this method is that the researcher or a member of the research team can collect the completed responses within a short period of time. Any doubts that the respondents might have regarding any question could be clarified on spot.

Administering questionnaires to large numbers of individuals simultaneously is less expensive and less time-consuming than interviewing it also does not require as much skill to administer the questionnaire as to conduct interviews. However, organizations are often unable or not willing to allow the use of work hours for data collection (Sekaran, 2000).

On the other hand, electronic questionnaires (E-mail) are easy to administer, can reach globally very inexpensive, fast delivery and the respondents can answer at their convenience like the mail questionnaire. However, electronic questionnaire need respondent with computer literacy. Respondents must be willing to complete the survey and must have access to the facility.

Having considered the pros and cons of each data collection methods for a survey design, it is decided that face to face interviews including personally administrated questionnaire and also electronic questionnaire through email will be use for this study. These techniques might overcome the limitations of mail questionnaires such as inability of researchers to probe for more information (Emory & Cooper, 1991).

The dependent variable for this study is new product development success in manufacturing environment. This dependent variable is measured using 6 items adapted from Griffin and Page (1993). All items would be rated using a 5-point Likert scale with 1 representing strongly disagree to 5 representing strongly agree. The 3 independent variables are each measured using 5 items adapted from many previous researchers. All

21 items would also be rated using a 5-point Likert scale with 1 representing strongly disagree to 5 representing strongly agree.

3.2 Data Collection Method

A questionnaire method shall be used to collect feedback from the potential respondents. The questionnaire will be distributed to the managers company. There will be 32 questions being prepared in the sheet whereby the questions will be divided into two sections. The first section is aim to collect personal details and organization information, followed by second section which aims to assess in the respondents' experience which consist five variables of top management support, external support, NPD strategies, NPD teams and NPD success.

There are two essential requirements for the questionnaire. There are relevancy and accuracy. Designed for a questionnaire to be relevant, just required data is gathered. Accuracy is acquired by having as high validity and dependability as probable (Zikmund, 2003). Once designing the questionnaire, lots of attempt was set into the use of language, hence that high technological terminology used would not be transferred into the questionnaire. The respondents, who were a sample of managers from different companies but in same industry, could become confused if the terminology used were to lie outside their knowledge.

3.3 Sampling Design

The targeted population for this study would be managers from manufacturing sector in Malaysia. The sample would be managers from Malaysia northern region manufacturing firms in Perlis, Kedah and Penang. This is due to the readily availability of manufacturing firms in Perlis, Kedah and Penang and due to the element of time constraints. These particular types of industry were chosen as the research samples compare to other industries for instance, manufacturing related firm which these industry were more involve in new product development.

This study aims to collect a sample size using purposive sampling as the targeted samples need to be exposed to managers. In order to make easy the exploration of this research, there are several requirements had been setup to achieve the objective of this study. The requirements is respondent will be focus on the managers of the company whereby they are the one who had experienced and handling about new product development in the organization and they were the one which facing it every day.

3.4 Statistical Technique Analysis

Statistical Package for the Social Sciences (SPSS) software version 18.0 will be used to statistical analyses the data which will be gathered from the respondents in Malaysian manufacturing sector. The requirements gathering process takes as its input the goals recognized in the high level requirements section of the project plan. Each goal

will be refined into a set of one or more requirements. These requirements define the major functions of the intended strategic planning, define operational data areas and reference data areas, and define the initial data entities. Major functions include critical processes to be managed, as well as mission critical inputs, outputs and reports. For this study the requirements gathering will occur through distributed the questionnaire of the respondents in Malaysian manufacturing sector.

By using SPSS 18.0 to analyze the data collected from the respondents, there is numerous analysis tools had been used technically to generate analytical information. Those analysis tools applied in this research are reliability test, multiple regression and correlation to examine and test the data to achieve the research objective. As a result, the generated information may helps to provide an overview which enable the researches to analyze each hypothesis comprehensively.

3.4.1 Bivariate Correlation

Bivariate correlation was used to test the relationship between top management supports, internal/external supports, product strategies and training to new product development (NPD) success. Correlation coefficient revealed the magnitude and direction of relationships. The magnitude is the degree to which variables moved in unison or in opposition (Sekaran, 2003).

3.4.2 Multiple Regression Analysis

Multiple Regression analysis is a form of general linear modeling. A multivariate statistical technique was used to examine the relationship between a single dependent variable and a set of independent variables. This application is useful for hypothesis 1(H1) to hypothesis 4 (H4) to explain the variance of the four independent variables on a single dependent variable.

There are four important statistical assumptions for multivariate technique to representing the requirements of the underlying statistical theory. They are normality, linearity, homoscedasticity and multicollinearity (Hair, 2006). The series of graphical and statistical tests directed towards assessing the assumptions underlying the multivariate techniques revealed relatively little in terms of violations of the assumptions. Where violations were indicated, they were relatively minor and did not present any serious problems in the course of data analysis.

3.5 Summary of the Chapter

In this chapter, the focus of the discussion has been on the research methodology used in this study. It encompasses four main topics namely the research design, data collection method, sampling design, and data analysis. The next chapter will present the results of main study followed by some discussions on how these outcomes compared to those of prior studies.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter discusses the results of the data analysis. Statistical Package for Social Sciences (SPSS) Version 18.0 was used to analyze the data. Starting with the overview of the collected data, it is followed by various statistical analyses such as reliability analysis, correlation test and multiple regression analysis. The final section of this chapter provides a summary of the hypotheses testing.

4.2 Background of the Respondents

Originally, 250 respondents responded to the distributed questionnaires. However, only 229 of the cases were usable. Table 4.1 describes the characteristics of the companies and the respondents according to their demographic background. Majority of the companies attached by the respondents were aged 10 to 15 years old (52.8%). 44.1 percent of the companies age between 5 to 10 years and 1 to 5 years (0.9%). Only 2.2 percent of the companies were aged more than 15 years old. More than half of the companies employed 101 to 200 (36.2%) and 201 to 500 (45.4%) of employees. There were also 71.2 percent of manufacturing companies, compared to electric and electronic companies (28.8%). All of the companies were involved in product development, with at least 1 to 5 product patterns (59.8%).

As for the respondents, almost all of them had completed their bachelor degree (96.5%). 3.5 percent of them were postgraduate employees. 37.1 percent each work as manufacturing manager and marketing manager. The companies they attached had spent 3 to 4 percent (31.0%) of the equity for R&D expenditure. Other companies had spent 4 to 5 percent (53.3%) and more than 5 percent (15.7%) of their equity on R&D.

Table 4.1
Background of the Respondents

	Frequency (n)	**Percentage (%)**
Age of the Company		
1-5 years	2	.9
5-10 years	101	44.1
10-15 years	121	52.8
More than 15 years	5	2.2
Number of Employees		
0-100	28	12.2
101-200	83	36.2
201-500	104	45.4
501-1000	14	6.1
Type of Business		
Electric and Electronic	66	28.8
Manufacturing	163	71.2
Involved in Product Development		
Yes	229	100.0
No. of Pattern		
1-5 products	137	59.8
5-10 products	92	40.2
Educational Level		
Bachelor degree	221	96.5
Postgraduate	8	3.5
Position		
Manufacturing Manager	85	37.1
Marketing Manager	85	37.1
Manager	59	25.8
Percentage of R&D Expenditure		
3-4%	71	31.0
4-5%	122	53.3
More than 5%	36	15.7

4.3 Reliability of the Data

The reliability of an instrument refers to its ability to produce consistent and stable measurements. Reliability can be seen from two sides: reliability (the extent of accuracy) and unreliability (the extent of inaccuracy). To test the reliability of the pilot study, the test employed internal consistency method measured by Cronbach's alpha.

The reliability is expressed as a coefficient between 0 and 1.00. The higher the coefficient the more reliable is the test. The most common reliability coefficient is the Cronbach's alpha which estimates internal consistency by determining how all items on a test relate to all other items and to the total test - internal coherence of data. As the measurement of instrument used in this study was the questionnaire constructed in several questions, the measurement instrument used is the internal consistency by Cronbach's coefficient. Cronbach's alpha implies to the positive relationship of one item with another. Acceptable Cronbach's alpha is greater than 0.65.

The results of reliability test for this study are summerised in Table 4.2. It is found that cronbach's Alpha for top management support is 0.816, NDP strategy (0.890), NDP success (0.845), training (0.905), internal support (0.845) and external support is 0.800. Cronbach's alpha for each variable were found to be greater than 0.65, indicating the acceptable value.

Table 4.2
Reliability of the Instrument

Variable	**N of item**	**Cronbach's Alpha**
Top Management Support	7	0.816
New Product Development Strategy	9	0.890
New Product Development Success	7	0.845
Training	7	0.905
Internal Support	3	0.845
External Support	3	0.800

4.4 Normality

4.4.1 Visual Approach

Normality tests are used to determine whether a data set is well-modeled by a normal distribution or not, or to compute how likely an underlying random variable is to be normally distributed. More precisely, they are a form of model selection, and can be interpreted several ways, depending on one's interpretations of probability. The other step in analyzing the data for this study is to examine the normality of the data by assessing the shape of distribution. A test was conducted to determine variable are done through visual inspections and statistical testing. An informal approach to testing normality is to compare a histogram of the sample data to a normal probability curve. The empirical distribution of the data (the histogram) should be bell-shaped and resemble the normal distribution. While statistical approach consists of skewness and kurtosis to examine data normality test.

Figure 4.1, Figure 4.2.2, Figure 4.3, Figure 4.4, Figure 4.5 and Figure 4.6 show the histogram of all variables tested in this study. It can be viewed in the figures that there are the normal curve distributions. Hence, the visual approach suggest that the data are normal distributed.

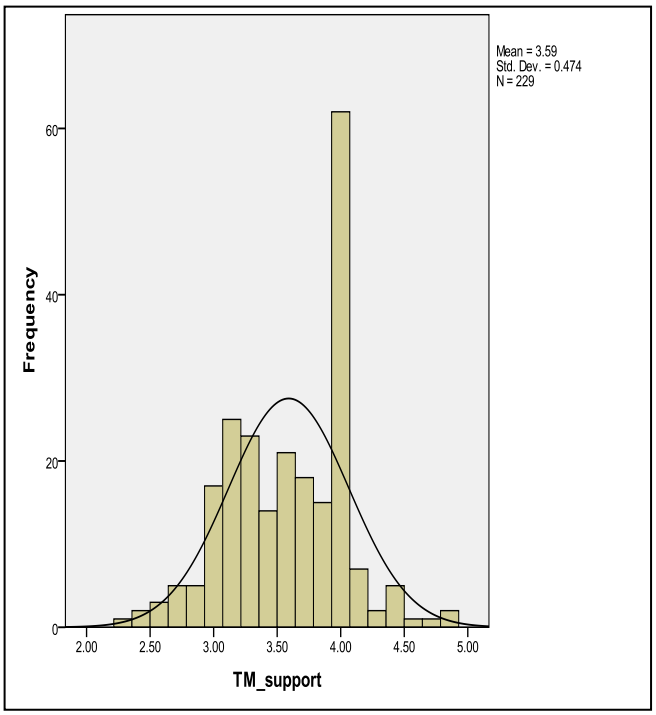

Figure 4.1
Histogram of Top Management Support

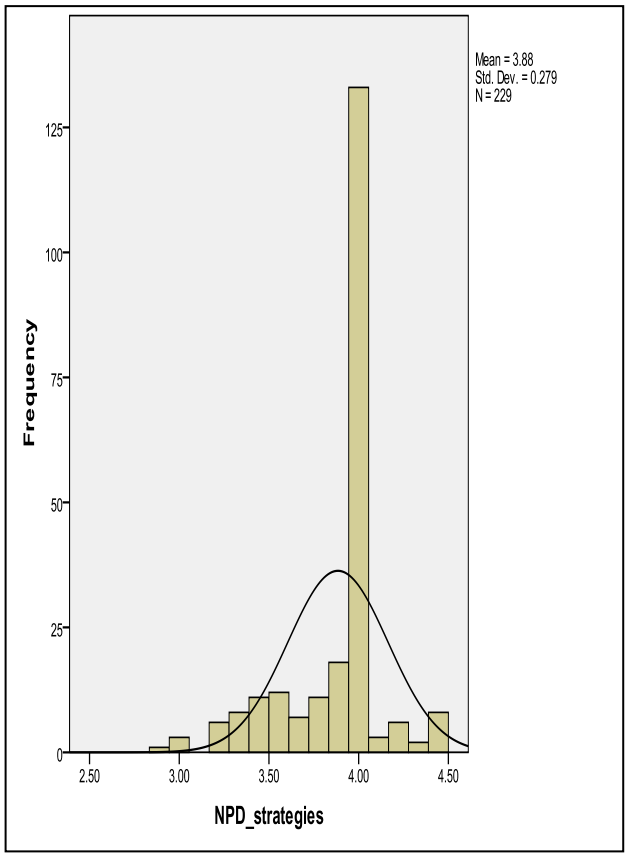

Figure 4.2
Histogram of NDP Strategy

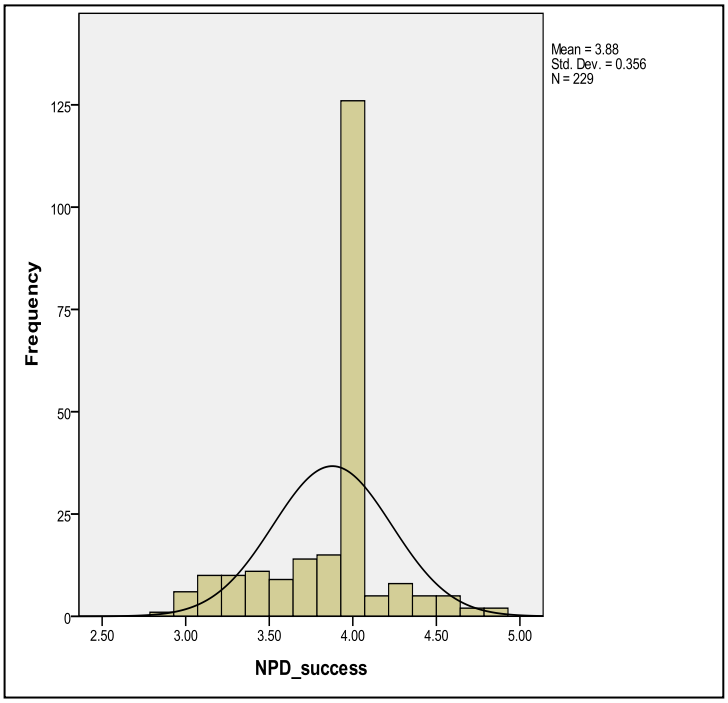

Figure 4.3
Histogram of NDP Success

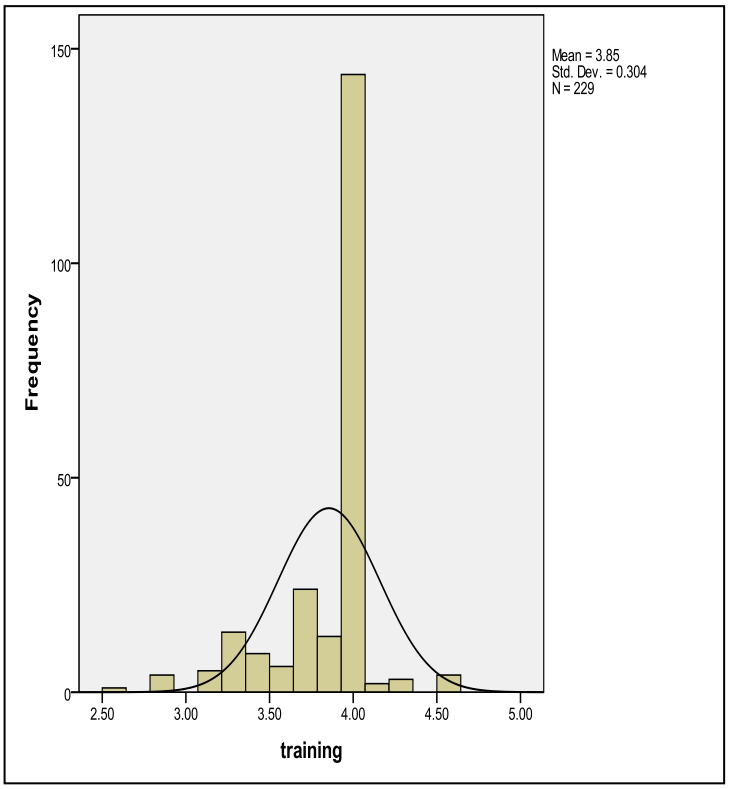

Figure 4.4
Histogram of Training

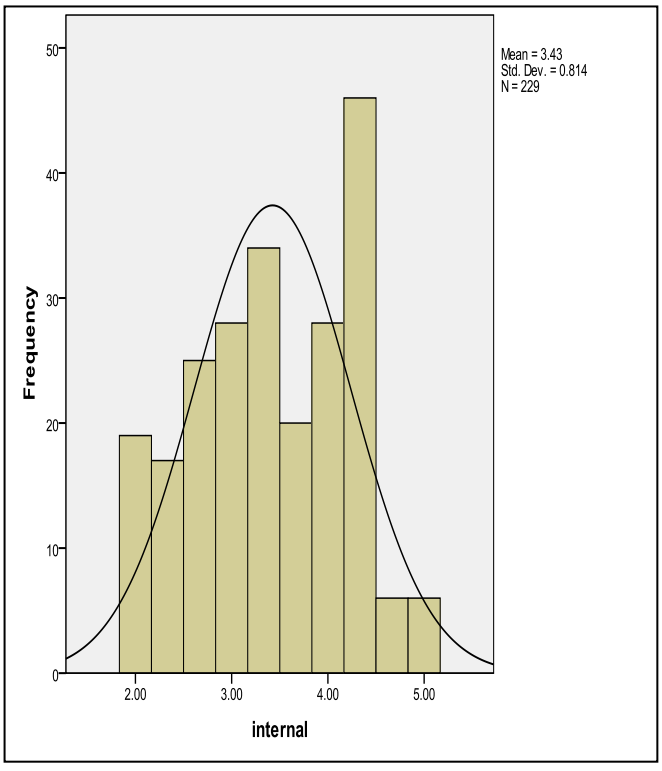

Figure 4.5
Histogram of Internal Support

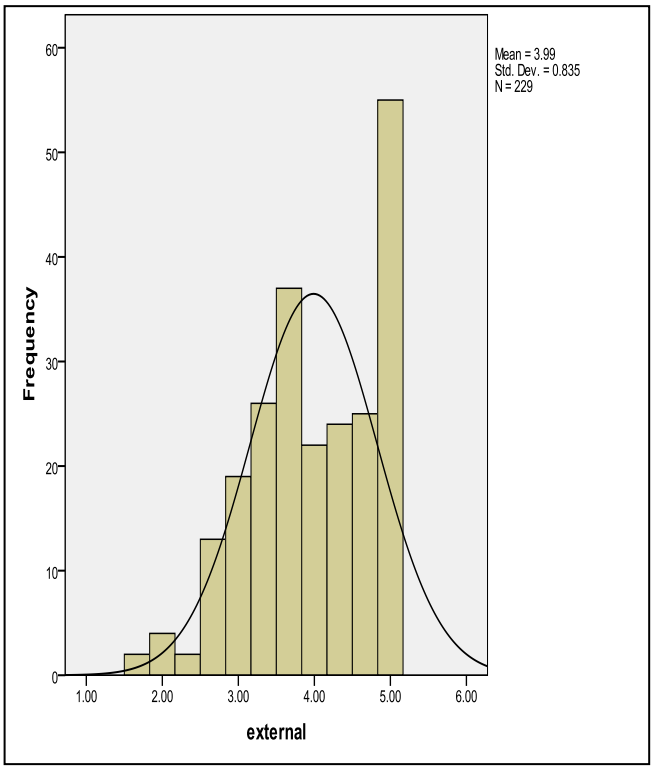

Figure 4.6:
Histogram of External Support

4.4.2 Statistical Approach

To reconfirm our testing on normality of the data, statistical approach was used using skewness and kurtosis. Skewness values present the symmetry of the distribution score and a skew variable's mean will not be at the center of this distribution; while kurtosis confer information about the "peakness" of distribution which can be either too peaked (with short and thick tail) or too flat (with long and thin tail) (Tabachnick & Fidell, 2001). Normal distribution is considered when value of skewness and kurtosis is at zero (0).

Positive skewness value will have a cluster of cases to the left at a low value and negative skewness will have the score cluster or pile at the right side with a long

left tail (Tabachnick & Fidell, 2001). Kurtossi with values of below zero (0) will indicate a relative flat distribution known as “playkurtic” and the kurtosis values above zero (0) indicate a peak distribution or “leptokurtic”. T is recommended by researchers that samples be large enough (minimum 200) to prevent under-estimation of variance. Seldom will perfect normality assumption be achieved. To assess the normality of the variables, the above suggestions were applied and noticeably none of the variables fell outside the +-3.29 at $p<0.001$ probability range level. Table 4.9 is a summary of the kurtosis and skewness for all the variables. The data shows the variables were normally distributed. Therefore, in conclusion, all the variables do not deviate the normality test requirement.

Table 4.3
Skewness and Kurtosis for the Variables

Variable	**Skewness**	**Kurtosis**
Top Management Support	-.189	-.322
New Product Development Strategy	-1.123	1.579
New Product Development Success	-.596	.917
Training	-1.440	2.745
Internal Support	-.125	-1.016
External Support	-.436	-.611

4.5 Descriptive Analysis

Descriptive analysis was used to determine the level of importance of each variables and its dimension. To determine the importance level of these factors, this study computed the mean and uses the middle point to separate the level from low, moderate and high level as mentioned by Healey (2005). Mean score is divided to three levels as follows:

a. Low Importance = 1.00 to 2.25

b. Moderate Importance= 2.26 to 3.75

c. Very Importance = 3.76 to 5.00

Table 4.4 describes the results of descriptive analysis to measure respondents' perception towards all variables studied. It is found that respondents perceived that NPD strategy (mean=3.89, sd=0.28), NPD Success (mean=3.88, sd=3.56), training (mean=3.85, sd=0.30) and external support (mean=4.00, sd=0.84) were very important in new product development.

Table 4.4
Descriptive Analysis of the Variables

Variable	**Mean**	**Sd**	**Level**
Top Management Support	3.5908	.47426	Moderate
New Product Development Strategy	3.8845	.27949	Very importance
New Product Development Success	3.8777	.35554	Very important
Training	3.8546	.30421	Very important
Internal Support	3.4250	.81401	Moderate
External Support	3.9898	.83502	Very important

4.6 Hypotheses Testing

Five main hypotheses were developed in this study. This section attempts to test the developed hypotheses using appropriate statistical methods. Bivariate correlation was used to test H1 to H4, while multiple regressions to test H5.

H1: There will be positive relationship between top management supports and NPD.

Table 4.5 summarised the pearson correlation analysis to examine the relationship between top management support and NPD. It was found that there was a positive association between the variables ($r=0.443$, $p<0.01$), indicating the significant relationship between them. It is concluded that there is a significant positive relationship between top management support and NPD. Hence, H1 is accepted.

Table 4.5
Relationship between Top Management Support and NPD

	NPD (r)	**Sig.**
Top Management Support	0.443	0.000

H2: There will be positive relationship between internal/external supports and NPD.

Correlation analysis to study the relationship between internal/external support and NPD is presented in Table 4.6. The analysis indicated that there was also a significant positive relationship between the variables. It could be concluded that there is a significant positive relationship between internal/external support and NPD ($r=0.367$, $p<0.01$). Again, H2 is accepted.

Table 4.6
Relationship between Internal/External Support and NPD

	NPD (r)	**Sig.**
Internal/External Support	0.367	0.000

H3: There will be positive relationship in product strategies and NPD.

Correlation analysis to study the relationship between NPD strategies and NPD is presented in Table 4.7. The analysis indicated that there was also a significant positive relationship between the variables. It could be concluded that there is a significant positive relationship between NPD strategies and NPD ($r=0.531$, $p<0.01$). Again, H3 is accepted.

Table 4.7
Relationship between NPD Strategies and NPD

	NPD (r)	**Sig.**
NPD Strategies	0.531	0.000

H4: There will be positive relationship in training and NPD

Table 4.8 summarised the result of correlation analysis between training and NPD. It is found that there is a significant relationship between training and NPD ($r=0.505$, $p<0.01$). H4 that stated the positive relationship between the variables will also be accepted.

Table 4.8
Relationship between training and NPD

	NPD (r)	**Sig.**
Training	0.505	0.000

H5: There will be positive effect of top management support, NPD strategies, training and internal/external support on NPD

Last hypotheses developed to examine the effect of top management support, NPD strategies, training and internal/external support on NPD. The results of Multiple linear regression to examine these effect is illustrated in Table 4.9. It was found that top management support, NPD strategies, training and internal/external support had explained 39.4 percent of NPD (R^2=0.394, F=36.456, p<0.01). Among the variables, training was found to have the biggest prediction on NPD (B=0.320, t=2.827, p<0.01), followed by internal/external support (B=0.259, t=4.806, p<0.01) and top management support (B=0.200, t=4.134, p<0.01). However, it was also found that NPD strategy failed to predict NPD (B=0.100, t=0.716, p>0.05). These results provided the evidence to accept H5. Hence, H5 is accepted.

Table 4.9
Effect of Top Management Support, NPD Strategies, Training and Internal/External Support on NPD

	B	**t**	**Sig.**
Top Management Support	.200	4.134	.000
New Product Development Strategy	.100	.716	.475
Training	.320	2.827	.005
Internal/external Support	.259	4.806	.000
R^2	*0.394*		
F	*36.456*		
Sig.	*0.000*		

4.7 Summary of the Chapter

This chapter presents the basic profile of the survey respondents such as age of companies, number of employees, type of business, no of pattern and others. Several assumptions were examined such as normality, and descriptive analysis. The results of the main effects provide support for the hypothesis.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter will have a deep discussion on the findings in Chapter 4. The discussion will include the findings from frequency and descriptive analysis, followed by inference analysis from Chapter 4. This chapter will also give useful recommendation for further research in the same area.

5.1 Conclusion

5.1.1 Frequency Analysis

229 respondents were selected as respondents in this study. All of them have obtained secondary education and from managerial position in the company. From these backgrounds, respondents are able to answer the questionnaire properly as they were asked about company's activities.

5.1.2 Descriptive Analysis

Descriptive analysis to examine the level of respondents' perception towards new product development (NPD) and factors contributed to the success of the NPD. It was found that external supports was perceived as the most important factors in NPD, followed by NPD strategies and training. External support especially from government was important to influence the companies or industries in NPD. Government gives fund and special offers in taxes for companies in NPD research and development (R&D). The correct strategies were also needed in NPD. Market research should be done on NPD to find if the new product can be accepted in the market.

5.2 Hypotheses Testing

Five hypotheses were developed and tested in this study. Summary of the hypotheses testing is illustrated in Table 5.1. The findings have supported and accepted all of the hypotheses. NPD was found to have a significant relationship with top management support, NPD strategies, training and internal/external support. NPD strategies and training had the strongest relationship with NPD, compared to other variables. This finding suggests that to implement NPD, companies are relying with good strategies and training for employees. Better strategies and lot of training, the tendency to successful NPD will increase.

Table 5.1
Summary of Hypotheses Test

Hypothesis	Method of Analysis	Results	Summary
H1: There will be positive relationship between top management supports and NPD.	Pearson Correlation	r=0.443 p<0.01	Accepted
H2: There will be positive relationship between internal/external supports and NPD.	Pearson Correlation	r=0.367 p<0.01	Accepted
H3: There will be positive relationship in product strategies and NPD.	Pearson Correlation	r=0.531 p<0.01	Accepted
H4: There will be positive relationship in training and NPD	Pearson Correlation	r=0.505 p<0.01	Accepted
H5: There will be positive effect of top management support, NPD strategies, training and internal/external support on NPD	Multiple Regression	R2=0.394 p<0.01	Accepted

Top management and internal/external support were found as the significant factors to contribute to NPD success. Top management could establish the NPD team to enhance NPD. NPD team must include member who are focuses on the design and at least one member from sales and marketing function in order to provide insight into the wants and need of the targeted end-users of the new product. A fully integrated NPD team will also include at least one representative from manufacturing engineering, in order to preserve the efficient manufacturability of the new product during the design phase. Finally, NPD team must also include at least one member from purchasing and quality is to ensure that the R&D and marketing functions are provided with adequate intelligence concerning the suppliers' ad supplied products that they choose during product design. According to Burt and Soukup (1985), one of the biggest mistakes that a

purchasing manager can make failing to get involved in the requirement-development process, purchasing can provide intelligence concerning the ability of particular suppliers to meet capacity and quality requirements while the suppliers is still under consideration, before the supplier and its product are locked into the design.

In some circumstances, top management should also strongly consider engaged a supplier into the NPD team. The decision to include a supplier in the team will ultimately depend on the uniqueness of the supplied material under consideration. According to Monezka et al. (2002) and Wagner (2003), there are multiple benefits with this approach. They reported a smoother ramp-up to production volume, development of the design was easier and chosen designs were less costly for the suppliers to execute.

Correct and accurate strategies should also been applied in NPD. The company must determine how design decisions will be made. For example, marketing department and engineering department usually will have different views (Cagan & Vogel, 2002). Companies that learn to collaborate on design and negotiate in the face of conflict often arrive at better strategies. Collaboration and negotiation strategies may take longer in order to arrive at a design recommendation, but such strategies generally reduce the overall required to deliver new products to customers (Monezka, et al., 2000).

5.3 Recommendation for Further Research

Based on the literature review on factor to contribute to NPD success, four facets of practices were used as independent variables of this study, while NPD success was used as dependent variable. However there are many other variables such as R&D, supply chain management, market needs and autonomy which may also influence the relationship between these two variables, but was not included in the study. Therefore future researchers should include the variables in their attempt to study the success of NPD.

The research area and bigger sample should also to be consider for the future research. Future study should sample in whole Malaysia in order to get the best views on the problem. This particular suggestion will give the vast view on what was happen and could also give better representation of the population. Lastly, it is also the needs to consider the qualitative study in this issue. Qualitative method attempts to get the non-numerical description and could provide better feedback from the respondents through deep interview and observation.

5.4 Summary

This study has successfully answered all research questions and has tested all hypotheses. The findings give the empirical evidence that NPD success is influenced by top management support, NPD strategies, training and internal/external support. It is

hope that this study will give significant references to industries, academicians and students in the same fields.

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UNIVERSITI UTARA MALAYSIA

OTHMAN YEOP ABDULLAH GRADUATES SCHOOL OF BUSINESS

POST GRADUATES PROGRAMME

Dear Respondent,

Sir/Madam,

I am a student Master of Science in Technology Management, Universiti Utara Malaysia. As one of the university's requirement, I am doing a research which the title is " Development of Top Management Support, Product Strategies and Internal Support in New Product Development Success On Manufacturing Firm in Malaysia". With reference to the above matter, kindly be informed that you have been selected as a respondent for this research.

I hope that you will spend some time to answer the attached questionnaire, as objectively and as sincerely as possible, and without fear or favor. Your responses will be treated as PRIVATE and CONFIDENTIAL and used solely for academic purposes.

I am looking forward to your cooperation in participating in this study, and for that I thank you.
May Allah bless you.

Yours sincerely,

Naimah binti Amlus,
Master of Science in Technology Management
Universiti Utara Malaysia

QUESTIONAIRE

SECTION A:

Please select [✓] ONE answer to each question which best suit your opinion:

1. What is your working company age (years)?

[ ] 1-5 years [ ] 5-10 years [ ] 10-15 years [ ] more than 15 years

2. What is the current number of employees?

[ ] 0-100
[ ] 101-200
[ ] 201-500
[ ] 501-1000
[ ] More than 1000

3. What is your company type of business?

[ ] Electric and electronics
[ ] Automotives
[ ] Equipments
[ ] Furniture
[ ] Manufacturing
[ ] Others (Please specify if any) ……

4. Do you involve in new product development of your company?

[ ] Yes [ ] No

5. How many patents for product in your working company?

[ ] 1-5 products [ ] 5-10 products [ ] more than 15 products

6. What is your highest educational level?

[ ] Primary [ ] Secondary [ ] Diploma

[ ] Bachelor Degree [ ] Master / PhD

[ ] Others (Please specify if any) ……

7. What is your position in working company?

[ ] CEO [ ] R&D Manager [ ] Manufacturing Manager [ ] Marketing Manager

[ ] Manager [ ] Others (Please specify if any) ……

8. How many percentage of your working company R&D expenditure?

[ ] Below 1%
[ ] 1-2%
[ ] 3-4%
[ ] 4-5%
[ ] More than 5%

SECTION B:

Instruction: Please select **[✓] ONE** answer using the following scale.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	**2**	**3**	**4**	**5**

Top Management Support	1	2	3	4	5
1.The leadership style from top management is important					
2.Top management provides the necessary resources for NPD programs					
3.Top management provides authority power for NPD programs					
4.Top management provides clear vision of the product concept					
5.Top management provides organizational support for change in NPD programs					
6.Top management generates enthusiasm for NPD programs					
7.Good communication between top management and the NPD teams					

Product Strategies	1	2	3	4	5
1.Product cost cutting implemented in NPD programs					
2.Product modification used in NPD programs					
3.Company must create product line extension					
4.Company must create new product line					
5.Using a formal NPD process is important					
6.Company using offensive/high risk strategy					
7.Company using defensive/low risk strategy					
8.Technology capability and product capability use as a strategy					
9.A specific strategy needed in NPD programs					

New Product Development Success	1	2	3	4	5
1.NPD strategies effects on the customer acceptance in new product					
2.NPD strategies effects on the customer satisfaction in new product					
3.NPD teams aware that company attain the profitability goal					
4.Top management aware that company attain return on					

investment goal						
5.Top management know that they achieve product performance goal						
6.NPD teams meet the quality guideline						
7.NPD strategies effects on percentage of sales by new product						

TRAINING

TRAINING FOR NEW WORK STRUCTURE						
	Task	1	2	3	4	5
1	basic skills (reading, writing etc.)					
2	Leadership training					
3	life skill (stress management)					
4	problem solving					
5	product knowledge					
6	quality product skills					
7	technical product skills					

Thank You for Participation.